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Table of Contents

International Journal of Commerce and Finance, Vol. 1, Issue 1, 2015, 1-10

THE SCOPE OF STATE AID AND PUBLIC SERVICE OBLIGATION FOR AIRPORTS AND AIR CARRIERS IN THE LIGHT OF EUROPEAN LAW

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Abstract:

Public aid is the kind of advantage granted directly or indirectly for private companies from State resources. The European Commission prerogative to control the transfer of public resources by the public authorities (national or local) for the benefit of private undertakings, as a general rule, there is an obligation of notification, as provided for in article 108 (3) of the Treaty on the Functioning of the European Union (TFEU). It should be noted in the beginning that State aid given to undertakings conducting economic activity is, in principle, incompatible with the European Union' law, as provided for in article. 107 (1) of the TFEU.

There are certain situations that the granting of public funds will not constitute "public aid" within the meaning of article 107 of the TFEU and, therefore, will not violate European rules in this field. One of them are activities related to the exercise of the prerogatives of the public authority (security, safety, customs, air traffic control). The other is related to the exercise of services in general economic interest. This could be an example of public service obligation (PSO). This service can be applied in the light of the provisions of European law on two types of action on air routes, and on airport managing body. The imposition of a PSO to the specified route is the support given by the State to the outermost regions that due to their unfavourable geographical position cannot fully develop economically, and no carrier had not been interested in performing air services to that region due to the lack of cost effectiveness. Some activities at the airport may be considered as activities of general economic interest.

Keywords: *Air Carriers, Airports, European Law*

1. Introduction:

The European aviation market is fully liberalized. European air carriers may freely carry out air transport in each Member State of the EU, or a number of other European countries. Air carriers from third countries operating in Europe have some limitations resulting from bilateral agreements on air transport, however, they might have a wider range of freedom for the operation, provided that they have concluded horizontal agreement with the European Union . Liberalization of the aviation sector in the European Union in the first half of the 1990s. of the last century was a milestone in the development of this industry and contributed to the opening of the European sky. The consequence of these actions was the adoption of a variety of measures to ensure the conduct of free and fair competition between undertakings in this sector, while guaranteeing the citizens of the Union a high level of service provision. Opening of the market caused that many new air carriers entered the European market. This can be seen especially on the example of the emergence of low-cost-carriers. Liberalization of air transport in Europe was an abandonment from the principle of the "regulatory State" and adaptation to market mechanisms for the development of civil aviation. Liberalization didn't mean in many cases easy and "painless" phenomenon. Many traditional carriers went bankrupt, although their position on the market for many years before remained stable . At the same time this fact had to be accompanied by a certain degree of State aid to cope with new reality and sometimes to support the vitality of the entity.

The emergence of new trends, such as the appearance and rapid development of the air carriers with low-cost financial structure (low-cost airlines) caused, that airports had to focus on the new situation. Airports need to meet the challenges of an increasingly dynamic growth in air traffic, which was associated with greater intensity level of operations performed and the number of passengers. Favourable conditions have been opened for regional airports. New airports were being constructed and some of the existing ones were being modernized. As it may be noticed many of them showed significant activity in obtaining new air connections.

Starting from the beginning of the 1990s. of the last century, we have to deal with quite quickly implemented aviation policy by the European Union in accordance with the provisions of the common transport policy and increasing the prerogatives of the EU in the harmonization of aviation policy. On the basis of the case-law of the Court of Justice of the European Union in matters of the so-called "open skies" judgements of 2002, it is necessary, that State aid in the development of airports or to keep some of the smaller airlines through the ability to perform services within the public service obligation (PSO) rule, was in line with the EU law. There are some important questions to be raised. Is State aid to airports possible in any case? What are the conditions of granting State aid for private undertakings, in order not to disrupt the internal market? Is financing the air carrier performing services under the PSO does not distort competition? In what circumstances State aid may be granted to be compatible with EU law?

2. The Essence of Public Aid: The Notification Procedure

Public aid is the kind of funding, which might be given by the Central Authority (government administration) or by regional or local authority (local self-government bodies, such as municipalities) from the public sources to support the activity of private undertakings. It constitutes an advantage granted directly or indirectly for private companies from State resources. This policy applies to all the Member States of the European Union and those countries which have concluded relevant agreements with the EU on the application of these principles in their own national legal order, i.e. States belonging to the EEA (Iceland, Liechtenstein, Norway) and Switzerland. A body, which safeguards the correct transfer of public resources to the beneficiaries is the European Commission.

The Commission prerogative to control the transfer of public resources by the public authorities (national or local) for the benefit of private undertakings, as a general rule, there is an obligation of notification, as provided for in article 108 (3) of the Treaty on the Functioning of the European Union (TFEU, 2007). First of all, the obvious question is who and under what conditions must make the notification to the Commission. It should be clarified whether the beneficiary of the aid, which is dependent on the public authority which is its majority shareholder or owner is entitled *ex lege* to submit notification obtained from local government authorities or other.

In accordance with article 108 (3) of the Treaty the obligation of notification lies on the side of the Member States. The notification means informing the European Commission by the Member State (central, regional or local authority) about its intention to provide financial support to a particular undertaking. This means, in practice, that notification shall be made not by the beneficiary itself, but by the authority, which intends to give a public support or to change the existing one. The Commission must have time to issue its decision about the steps it shall undertake (Article 108 (3): *The Commission shall be informed, in sufficient time to enable it to submit its comments, of any plans to grant or alter aid*).

The above mentioned arguments applies to the condition in which there is a doubt as to whether the aid granted from public funds is in line with article 107 TFEU. The Treaty indicates the enumerative three cases in which State aid is compatible with its provisions on internal market. None of these cases does not qualify as an aid to aviation business undertakings. These cases are, in accordance with article 107 (2) of the TFEU, the following:

a) aid having a social character, granted to individual consumers, provided that such aid is granted without discrimination related to the origin of the products concerned;
b) aid to make good the damage caused by natural disasters or exceptional occurrences;
c) aid granted to the economy of certain areas of the Federal Republic of Germany affected by the division of Germany, in so far as such aid is required in order to compensate for the economic disadvantages caused by that division. Five years after the entry into force of the Treaty amending the Treaty on European Union and the Treaty establishing the European Community, the Council, acting on a proposal from the Commission, may adopt a decision. **(Note: Currently, the Council on Commission's proposal may at any time withdraw this provision).**

With regard to the aviation sector there may be indications resulting from article 107, paragraph 3 (a)), (a) (b), and (c). In accordance with the disposition of that provision, The following may be considered to be compatible with the internal market:

a) aid to promote the economic development of areas where the standard of living is abnormally low or where there is serious underemployment and of the regions referred to in Article 349, in view of their structural, economic and social situation;

b) *aid to promote the execution of an important project of common European interest or to remedy a serious disturbance in the economy of a Member State;*
c) *aid to facilitate the development of certain economic activities or of certain economic areas, where such aid does not adversely affect trading conditions to an extent contrary to the common interest*.

The above mentioned definition is written in the sub junctive, which means that actions taken must be validated pursuant to those provisions,. It should be presumed that the obligation to authenticate the aid received in accordance with one or more premises, as referred to above, shall rest upon the authority providing such assistance in consultation with the beneficiary of that aid. These premises do not constitute an automatic granting of public funds to a specific undertaking.

Before State aid is granted, the notification should occur. Notification is a mandatory procedure. The notification procedure is carried out when there is a suspicion that a "public aid" to any entity may be provided, and the only body to control the legality of such an action is the European Commission. The notification shall be made on the appropriate form set out in annex I of regulation 794/2004 in electronic form (Commission Regulation, 2004). The following information shall be included:

a) the identification of the aid granter,
b) the identification of the aid (description of the aid: primary objective and, if applicable, secondary objective; the information whether the notification relates to individual aid),
c) the national legal basis,
d) beneficiaries of the aid,
e) the amount of the aid,
f) form of the aid and means of funding,
g) duration of the aid,
h) supplementary information about a particular type of aid (Part III of Annex I to Regulation (EC) 794/2004),
i) all necessary attachments.

The notification procedure is mandatory only to the extent of any incompatibility with the EU law, and where the specific dispositions so provide. The lack of notification is a formal failure when having an intention to grant State aid, but is not an illegal action. It is worth noting at this moment to the legal structure of the provision of article 108 (2) of the TFEU, in which it was found, that: *If, after giving notice to the parties concerned to submit their comments, the Commission finds that aid granted by a State or through State resources is not compatible with the internal market having regard to Article 107, or that such aid is being misused, it shall decide that the State concerned shall abolish or alter such aid within a period of time to be determined by the Commission (…)*. It is clearly stated that this case is about the aid already granted, and not the intention of granting it in the future, as the Commission may take one of two decisions: abolish the existing aid or change it. Central Authority or local self-government administration cannot grant public aid before a decision is taken by the Commission in this case (the so-called standstill clause). When such aid shall be granted without notification to the Commission, the authority granting the aid must reckon with the fact that the Commission will call upon that authority to make an explanation whether or not there has been infringement of rules concerning State aid referred to in article 107 and article 108 of the TFEU. The Commission shall make a decision whether or not the granting of public funds is legal after taking an action referred to in Regulation (EC) no 659/1999. There is a specific procedure concerning the aid that need to be notified, or the procedure of aid granted illegally and provided against its purpose as well as the procedure concerning existing aid schemes.

The European Commission may ex officio commence the preliminary procedure, if it becomes aware of information coming from mass media or opponents about obtaining or intention to obtain aid from public. The Commission has three options:

a) will issue a decision stating that the aid is not “State aid” within the meaning of article 107 of the TFEU, or
b) will issue a decision stating that the aid is “State aid”, but it is compatible with the internal market, i.e. with article 107 (1) or (2) a), b) or c), or
c) will issue a negative decision stating that, following the procedure laid down in article 108 (2). (the main investigation), the aid is not compatible with the internal market and must not be used.

To sum up this part it must be noted, that reporting, notifications, *ex ante* is to avoid potential risks in the future. A Member State which does not apply to the Commission decision in the specified term, the latter may cause the transmission of the case directly to the Court of Justice of the European Union (CJEU). In the case when the aid was granted unlawfully, the Commission may pursue compensation claims from a Member State concerned. The compensation claim term is 10 years following a day, in which the aid was granted unlawfully to the beneficiary.
In the case of the aviation sector, there are the conditions for application of the State aid on the basis of some of the provisions of article 107 of the TFEU. Disposition referred to in article 107, paragraph 3 (a)) may be combined with the disposition of article 107, paragraph 3 (b) (c), which refer to aid to certain less developed regions to regions with significant unemployment. These are the NUTS II regions whose gross domestic product *per capita* is less than 75% of the EU average (European Parliament and of the Council, 2003). In turn, the disposition of article 107, paragraph 3 (b) refers to the important European projects, for example the expansion of the Trans-European Transport Networks (TEN-T).
Therefore, when analyzing whether the public aid granted in accordance with article 107, paragraph 3 (a), (b) or (c) will be legitimate, it must be explained whether this support will not "distort or threaten to distort the competition". This compliance must be demonstrated by the authority granting appropriate assistance from public funds.

3. The Case Law of the Court of Justice of the European Union on Public Aid for the Airport

It should be noted in the beginning that State aid given to undertakings conducting economic activity is, in principle, incompatible with the European Union' law, as provided for in article. 107 (1) of the TFEU. It was not clear in previous regulations of the Treaty (formerly known as Treaty establishing the European Community) concerning State aid to entities conducting economic activity can be referred to aviation undertakings, namely to airports. The Court in 1993 *expressis verbis* found, that airports are entities which conduct economic activity (see: Case *Poucet et Pistre* versus *AGF and Cancava*) (Court Reports 1993). In accordance with another case-law of the Court, any activity which offers goods and services on a given market i san economic activity (Case C-35/96, judgement of June 18, 1998, *Commission* versus *Italy* and in Joined Cases C-180/98-184/98, judgement of September 12, 2000, *P. Pavlov and others*). Thus, a service that airport offers to its users constitute an economic activity.
Extremely helpful was also the judgment of the Court of Justice of the EU of October 24, 2002 on "Aeroports de Paris" (C-82/01, Court Reports 2002, pp.I-09297). In accordance with Court's argumentation, (…) *In the field of competition law, the concept of an undertaking covers any entity engaged in an economic activity, regardless of its legal status and the way in which it is financed. (…)In order to determine whether the activities in question are those of an undertaking within the meaning of Article 106 of the TFEU, it is necessary to establish the nature of those activities. (…) The provision of airport facilities to airlines and the various service providers, in return for a fee at a rate freely fixed by airport management body, constitutes an economic activity. (…) Any activity consisting in offering goods and services on a given market is an economic activity*.
Not all, however, airport activities will be deemed as an economic activity. In accordance with the judgment of the Court of Justice of the EU of February 17, 1993 (Case *Poucet et Pistre* against *AGF et Cancava*) an economic activity of any entity, regardless of its legal status and the way in which it is funded is not its "social function" (Court Reports 1993). The activities of the entity associated with the social security fall under the principle of social solidarity, and are part of a non-profit activity. Therefore, these activities do not constitute the economic activity.

4. The Exercise of the Prerogatives of the Public Authority by an Airport

There are certain situations that the granting of public funds will not constitute "public aid" within the meaning of article 107 of the TFEU and, therefore, will not violate European rules in this field. One of them are activities related to the exercise of the prerogatives of the public authority. Here, it can be provided the following types of activities related to:

a) safety,
b) security,

c) air traffic control,
d) Customs Service,
e) air navigation services.

They are connected with the exercise of the prerogatives of the public authority and the article 107 of the TFEU does not apply to them. Some spheres are not of an economic nature, and therefore, the above mentioned areas can be financed by public funds, without the risk of activity incompatible with European law. In this respect, there is a final judgment of the Court of Justice of the EU from 1997 on Case *Cafe and Figli (Court Reports 1997)*. At the same time, there is no condition to make the notification procedure. The European Commission confirmed the view of the Court on the case of 2001, commenting as follows: *The air transport industry has itself traditionally borne the bulk of security costs. The reinforcement of certain security measures by the public authorities in the wake of attacks directed against society as a whole and not at the industry players must, in the Commission's opinion, be borne by the State. It goes without saying that, if certain measures are imposed directly on airlines and other operators in the sector such as airports, suppliers of groundhandling services and providers of air navigation services, the financing of such measures by the public authorities must not give rise to operating aid incompatible with the Treaty* (European Commission, 2001). It is important that any entity shall separate in its accounting the costs associated with an economic activity, which shall be borne by that entity, and the costs associated with the operation of the activities that the State will finance. Regardless of whether it is a public or private entity, it is necessary to specify the costs incurred by the State as ineligible for public assistance.

5. The Activities of General Economic Interest on the Example of Public Service Obligation

Public Service Obligation (PSO) can be considered to be services of general economic interest.
There is no definition of the term „public service obligation" to be found in the Treaty on the functioning of the European Union. This service can be applied in the light of the provisions of European law on two types of action:

a) on air routes, and
b) on airport managing body.

5.1. PSO and Air Carriers

PSO is a restriction of the exercise of the carrier's traffic rights. The legal basis for the imposition of public service obligations is article 16-18 of Regulation 1008/2008 of 24 September 2008 on common rules for the operation of air services in the European Union(OJ UE, 2008). A Member State may impose it having regard to the following principles:

a) after consultations with other interested Member States,
b) after having informed the Commission, the airports concerned and air carriers operating on the route,
c) imposing the public service obligation on a route:
    - between an airport in the European Union and an airport serving a peripheral or development region in its territory, or
    - on a thin route to any airport on its territory any such route being considered vital for the economic and social development of the region which the airport serves,
d) the obligation shall be imposed only to the extent necessary to ensure on that route the minimum provision of scheduled air services satisfying fixed standards of continuity, regularity, pricing or minimum capacity, which air carriers would not assume if they were solely considering their commercial interest,
e) the fixed standards imposed on the route subject to that public service obligation shall be set in a transparent and non-discriminatory way.

What's more, in such a case where other modes of transport cannot ensure an uninterrupted service with at least two daily frequencies, the Member States concerned may include in the PSO the requirement that any EU air carrier intending to operate the route gives a guarantee that it will operate the route for a certain period, to be specified, in accordance with other rules concerning PSO.

It is important that public service obligation shall be established on the route, and not on an air carrier which will actually perform it. In accordance with article 16 (4) of the Regulation 1008/2008 *when a Member State wishes to impose a public service obligation, it shall communicate the text of the envisaged imposition of the public service obligation to the Commission, to the other Member States concerned, to the airports concerned and to the air carriers operating the route in question*. The information notice on a public service obligation shall be published by the European Commission in the *Official Journal of the European Union*. However, where the number of passengers expected to use the air service is less than 10 000 per annum, the notice on PSO may be published in the national official journal of the Member State concerned. The date of entry into force of a PSO shall be the date indicated in the publication of the information notice in official journal.

The EU air carrier shall be able to offer seat-only sales provided that the air service in question meets all the requirements of the PSO. Consequently that air service shall be considered as a scheduled air service. Warto podkreślić, że jeśli przewoźnik lotniczy operował już na tej trasie wcześniej, to od momentu wejścia w życie przepisów o nałożeniu obowiązku użyteczności publicznej na obsługiwaną przez niego trasę, może on wykonywać operacje w oparciu o tę zasadę. Notwithstanding the above mentioned provisions, any EU air carrier shall at any time be allowed to commence scheduled air services on a specific route meeting all the requirements of the PSO imposed on that route. This freedom is, however, limited to the situation when no EU air carrier is interested in performing scheduled air services on a specific route in accordance with the PSO imposed on it. In such a situation, the Member State concerned may limit access to the scheduled air services on that route to only one EU air carrier for a period of up to four years. This period may be up to five years if the public service obligation is imposed on a route to an airport serving an outermost region, referred to in Article 349 (2) of the TFEU[1]. However, in this case, in accordance with article 16 paragraph 1 and without prejudice to article 17 of regulation 1008/2008, Member States must carry out a public tendering procedure.

A public service obligation shall be deemed to have expired if no scheduled air service has been operated during a period of 12 months on the route subject to such obligation, in accordance with article 16 (11) of the Regulation 1008/2008.

PSO is very widespread in many Member States. At the end of 2014, there were 225 routes in the EU, with PSO imposed on them, in the following countries: Norway (51 routes), France (42 routes), Greece (route 28 routes), Portugal (24 routes), United Kingdom (22 routes), Italy (20 routes), Spain (18 routes), Sweden (10 routes), Estonia (4 routes), Finland (3 routes), Ireland (3 routes).

In conclusion, the imposition of a PSO to the specified route is the support given by the State to the outermost regions that due to their unfavourable geographical position cannot fully develop economically, and no carrier had not been interested in performing air services to that region due to the lack of cost effectiveness (low frequency of flights, a small number of passengers).

5.2. PSO Towards Airports

Some activities at the airport may be considered as activities of general economic interest. Although according to the European Commission, certain economic activities carried out by airports can be considered by the public authority as constituting a service of general economic interest[2]. In this regard, the authority imposes on the airport management body a commitment to perform PSO, which may receive compensation for the provision of such services. There is also the possibility to recognize the management of the airport as a whole for the service provided in the general economic interest. Then, in accordance with the Commission's position expressed in paragraph 34 in conjunction with point 53 (iv) of the *Guidelines*… of 2005 the management of the airport could not cover activities not related directly to its core activities and commercial activities (e.g. use and renting of land and buildings). Such action, however, is rare.

[1] It's about the following regions, French Guiana, Martinique, Réunion, Saint-Barthélemy, Saint-Martin, the Azores, Madeira and the Canary Islands.

[2] See par. 34 of *Community guidelines on financing of airports and start-up aid to airlines departing from regional airports*, OJ EC, C 312, 9.12.2005.

Helpful in explaining whether the compensation in respect of the provision of PSO does not constitute State aid in the light of article 107 of the TFEU, it is the judgment of the Court of Justice of the EU 2003 in *Altmark* Case[3]. In accordance with Courts position, compensation for the airport does not constitute State aid and is not covered by TFEU rules, when the following four criteria are met:

a) first, the recipient undertaking must actually have public service obligations to discharge and the obligations must be clearly defined,
b) second, the parameters on the basis of which the compensation is calculated must be established in advance in an objective and transparent manner,
c) third, the compensation cannot exceed what is necessary to cover all or part of the costs incurred in the discharge of public service obligations, taking into account the relevant receipts and a reasonable profit for discharging those obligations, and
d) fourth, where the undertaking which is to discharge public service obligations, in a specific case, is not chosen pursuant to a public procurement procedure which would allow for the selection of the tenderer capable of providing those services at the least cost to the community, the level of compensation needed must be determined on the basis of an analysis of the costs which a typical undertaking, well run and adequately provided with means of transport so as to be able to meet the necessary public service requirements, would have incurred in discharging those obligations, taking into account the relevant revenues and a reasonable profit for discharging the obligations.

Returning to the *Altmark* case-law, it should be noted that the compensation for the provision of public services by the beneficiary after the fulfillment of all four reasons as referred to above, is not State aid within the meaning of article 107 TFEU and article 108 of the TFEU. However, failure to meet at least one of these criteria, results in classification the aid as State aid within the meaning of article 107 of the TFEU. Then, it should only be explained, whether the granted support (aid) will not affect the EU trade exchange and whether it does not distort or threaten to distort the competition, as referred to in the above argumentation.

6. Conditions for State Aid to Regional Airports

It should be explained in the beginning, whether regional airports are in a better situation to receive State aid? Well, big airports are located in metropolitan areas and large cities, which is the reason to attract well-known air carriers to perform operations from that airport (e.g. Paris, London, Frankfurt). Regional ports are in the less favourable situation, as they do not usually have these carriers and may not offer passengers the most convenient flight route network. Location in the outermost region concerned affects the reduction of attractiveness and the image of the airport. Therefore, State aid in the development of regional airports should not encounter resistance from the European Commission. The development of new, or the expansion of existing regional airports in economically less developed regions can be an opportunity to increase their attractiveness and increase overall investment and improving macroeconomic indicators. In 2014 the Commission approved State aid to individual airports in five cases: Airport Altenburg-Nobitz (Germany), Stretto Airport (Italy), Groningen Airport (Netherlands), Ostrava Airport (Czech Republic), Airport Marseille-Provence (France). In previous years, similar number of applications have been approved. In the case of the Berlin-Schonefeld airports, in Germany, the Commission considered that in general, the aid granted to that airport cannot be considered as State aid. It was recognized that, although for many years, this airport received financial support from the Federal Government and local self-government for development, this support was compatible with EU rules on State aid (European Commission, 2014). However, in one case, in relation to the Gdynia Airport (Poland), the Commission considered that the financial contribution made by local and regional authorities was in breach of European rules. The Commission argued that this aid has contributed to the increasing competitive advantage, which was contrary to European competition law and State aid

[3] Case C-280/00, judgement of July 24, 2003, *Altmark Trans and Regierungspresidium Magdeburg*, Court Reports 2003, p.I-7747.

rules. Although a year later, on 26 February 2015, the Commission modified its decision while remaining on the assumption that the aid was incompatible with EU law, the resources to be returned have been diminished in relation to the costs incurred in the exercise of the prerogatives of the public authority (related to the safety), i.e.: the cost of buildings and equipment fire department, customs, airport security officers, police officers and border guards. The Commission, therefore, ordered, repayment of resources in the amount of about 22 mln EUR (European Commission, 2014).

Regional airport can lead certain types of economic activity. With the exception of two, referred to above, in other cases it may apply for State aid, which will be in line with article 107 (3) of the TFEU. There are four criteria of the airport activity, in which there is possible to obtain State funding, in accordance with par.53 of *Guidelines*… of 2005.

First, construction of airport infrastructure and equipment (runways, terminals, aprons, control tower) or facilities that directly support them (fire-fighting facilities, security or safety equipment). In such a case, the Commission will assess whether there was State aid in this area, and whether it is in accordance with article 107, paragraph 3 (a), (b), or (c) and article 106 (2). Namely, whether a specific type of project refers to general economic interest (e.g. the development of the region), whether it is indispensable for the designated purpose, whether all potential users can freely use this project, and whether it is compatible with the general interests of the Union.

Second, operation of the infrastructure, comprising the maintenance and management of airport infrastructure. Generally, State aid in this area would be inconsistent with the provisions of the Treaty, since it comes from the assumption that the airport operator, like any other operator in the market, should cover from its own resources the costs associated with the management of the infrastructure. Otherwise, he would have been exempt from current expenditure, which would result in a significant way to infringe the competition rules of the European Union. If a public entity acts as would a private investor in a market economy, this cannot be recognized as State aid, in accordance with the *Altmark* Case of 2003. In another case, support from public funds may be considered as State aid in the operational purpose and it will be in line with article 107, (3) (a) and (c), or article (106) (2), if the aid is to support the region in which there is high unemployment, the standard of living is lower than in the rest of the country and the provision of the service will take place in the general economic interest as well as in accordance with the interest of the Union. Regional airports have therefore the possibility of development, having received State aid in this subject, which will be compatible with EU law.

Third, provision of airport services ancillary to air transport, such as groundhandling services and the use of related infrastructure, fire-fighting services, emergency services, security services, etc. The European Union has defined threshold for this kind of activity, beyond which the public aid is impossible and would be incompatible with the provisions of the Treaty. In accordance with Council Directive 96/67/EC of 15 October 1996 on access to the groundhandling market at EU airports, the provision of this service is a commercial activity, when annual traffic is not less than 2 million passenger movements. Otherwise, the airport management body, acting as a service provider, may separate the various sources of its revenue and losses between purely commercial activities, with the exception of the public funds allocated to it for the provision of the service of general economic interest.

Fourth, pursuit of commercial activities not directly linked to the airport's core activities, including the construction, financing, use and renting of land and buildings, not only for offices and storage but also for the hotels and industrial enterprises located within the airport, as well as shops, restaurants and car parks. However, these are not transport activities, so public financing of them is not covered by these guidelines and will be assessed on the basis of the relevant sectoral and general rules.

7. The Commence of Regional Airport Activity and Public Aid

Another important issue is the answer to the question whether State aid is allowed to commence the airport business. When taking into account large airports (hubs) it hard to imagine that such aid would be acceptable and the Commission would approve it. The argumentation could be as follows, that it distort the competition, because huge aiport has more opportunities to develop than smaller airport, in peripheral regions. Nevertheless, when we look at closer to the example of Berlin Brandenburg Airport (BBI), we may notice some incoherency and split in argumentation (Gerlach, 2015). In the case of regional airports in certain situations such a possibility exists. The Commission is well aware of the fact that regional airports have a small number of passengers, which can often not be sufficient to overcome the profitability of the airport. Large airports (hubs) do not have a problem with it because

of the support of a significant number of passengers and the geographical location in the big cities or metropolitan areas which makes them more attractive.
There is no uniform interpretation about the number of passengers to be the threshold of profitability. It is estimated it at 500,000, 1 million, or even 1.5 million. It depends on many factors, i.e. the location of the State, the region, the choice of specialisation and organisation of the airport. As a general rule air carriers do have anxiety about opening new air routes from unknown airports. Therefore, the European Union allows the State funding for a specific route by imposing by a Member State concerned a public service obligation to that route. Those carriers who wish to perform operations to and from such regional airport can benefit from that PSO. Thanks to this, the airport will be able to better promote and achieve or exceed the threshold of profitability, and the region a chance to social and economic development. Therefore, State aid for the launch of the new routes will be in line with article 107 (3) (a) or (c) with reservation, that there will be no high-speed rail connection on this route. In fact, the Union supports the transport intermodality solutions as referred to in the White Paper of 2011. However, connections performed between regional airports located in outermost areas and overseas of some of the Member States (e.g. French Guiana, Reunion, the Azores) to neighbouring third countries in Africa or Americas can receive State support in accordance with article 107 (3) (a) of the TFEU. The idea is to promote integration in that specific region and counter the isolation of such a place. Similarly, public aid for air carriers starting operations from airports located in sparsely populated regions could be considered as compatible with EU law.

8. Conclusion:

Public aid in aviation is acceptable only under the conditions laid down in the Treaty on the Functioning of the European Union. Granting funds to a specific airport shouldn't distort the competition in that area, i.e. other surrounding airports. Air carriers may also have co-financed activity if they perform flights covered by the public service obligation. Member States may decide, whether a specific route is important to the whole country and impose a PSO to that route, so air carriers may start performing operations to be partially or substantially financed by the public authorities. It must be noted, that such PSO on a specific route may be imposed when no air carrier is interested in performing flights on that route in market economy.
The activity of undertakings in market economy is undisturbed with reservation that the State performs to each one of them a harmonized policy and they have equal treatment and none of them has more favourable position by these authorities. Providing special help or treatment for a specific undertaker or group of undertakings on the domestic market would constitute discrimination against the other, and as a consequence even to limit the number of similar undertakings in this market. Such action could lead to a monopoly on a particular sector, and that as a consequence could threaten to disturb the functioning of the market.
It happens sometimes, that States in various forms promote national entrepreneurs, not only in granting direct money but also by carrying out policy in favour of the development of the company. In the sense of free-trade rules it is the disruption of business activities, and in terms of national interest, it means defending their own entrepreneurs and their protection on the market before foreign competitors. The combination of these two ideas have been materialized in the rules laid down in the European Union. The European Union is taken as a whole, all Member States have an obligation to apply to the adopted rules, which excludes any national derogations. In this case, the Union sets a uniform rule for all of its members. Therefore, on the one hand it creates a right to protect each trader from any Member State and the principle of equality and non-discrimination on grounds of nationality are applied throughout its area, on the other hand, acts as a single entity (one State) to protect its market from external competition from non-member countries and promotes European undertakings.

References

Community guidelines on financing of airports and start-up aid to airlines departing from regional airports, OJ EC, C 312, 9.12.2005.
Case C-280/00, judgement of July 24, 2003, Altmark Trans and Regierungspresidium Magdeburg, Court Reports 2003, p.I-7747.

Commission Regulation (EC) No 794/2004 of 21 April 2004 implementing Council Regulation (EC)No 659/1999 laying down detailed rules for the application of Article 113 of the TFEU, OJ UE, L 140, 30.04.2004, p.1-134.
Case C-343/95, judgement of March 18, 1997, Calě & Figli versus Servizi Ecologici Porto di Genova (Court Reports 1997, pp. I-1547).
European Commission, Communication from the Commission to the European Parliament and the Council - The repercussions of the terrorist attacks in the United States on the air transport industry, COM 574 (2001) final, 10.10.2001, par.27.
European Commission, Press release, State aid: Commission finds that public interventions at Berlin Schönefeld Airport did not involve state aid, IP/14/173, Brussels, 20.02.2014.
European Commission, Press release, IP/14/138, Brussels, 11.02.2014.
Joined cases C-159/91 and C-160/91, Court Reports 1993, p.I-637).
OJ UE, L 293, 31.10.2008, pp. 3—20.
The Treaty on the Functioning of the European Union (TFEU) was signed on December 13, 2007 in Lisbon (hence the name of the Treaty of Lisbon), and came into force on December 1, 2009 (OJ EU, C 306, 17.12.2007, p.1-271).
The system of Europe's classification into regions is existing since the 1970s. of the 20th century. The legal basis for this Division is in accordance with Commission Regulation No 1059/2003 of the European Parliament and of the Council of 26 May 2003 on the establishment of a common classification of territorial units for statistics (NUTS) (OJ L 154, 21.06.2003, p.1-41).
U. Zawatka-Gerlach, Berlin und Brandenburg fordern Einsicht in Antragspapiere, Der Tagesspiegel, 1.06.2015, Web edition: http://www.tagesspiegel.de/berlin/eu-pruefverfahren-zum-ber-berlin-und-brandenburg-fordern-einsicht-in-antragspapiere/11849842.html, access 20.09.2015.

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THE PERFORMANCE OF INDIAN EQUITY FUNDS IN THE ERA OF QUANTITATIVE EASING

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Abstract:

This study aims to evaluate the performance of Indian equity funds between January 2009 and October 2014. This study period coincides with the period of quantitative easing during which the developing economies in financial markets have been influenced. After the global financial crisis of 2008 came a period of quantitative easing (QE), creating an increase in the money supply and leading to a capital flow from developed countries to developing countries. During this 5-year 10-month period, in which the relevant quantitative easing continued, Indian CNX500 price index yielded approximately 21% compounded on average, per annum. In this study, Indian equity funds are examined in order to compare these funds' performance within this period. Within this scope, 12 Indian equity funds are chosen. In order to measure these funds' performances, the Sharpe ratio (1966), Treynor ratio (1965), Jensen's alpha (1968) methods are used. Jensen's alpha is also used in identifying selectivity skills of fund managers. Additionally, the Treynor & Mazuy (1966) regression analysis method is applied to show the market timing ability of fund managers.

Keywords: *Equity funds; performance evaluation; quantitative easing; Jensen's alpha*

1. Introduction:

Mutual fund performance has always become one of the most researched areas of finance studies. Using different technical measurement methods, these types of studies analyze fund performances of various markets from different perspectives. Especially, after the period of liberalization of the financial markets, mutual funds have gained much more significance among investors, resulting in various studies that have been carried out on performance evaluations. Mutual funds bring investors who share a common goal together. According to Deepak (2011), investors invest their money into capital market instruments such as shares, debentures and other securities. The returns from investments are equally shared among shareholders according to their investment ratio. Hence, mutual funds are proper investment and provide the chance to invest different professionally managed financial instruments. According to Rao (2006), diversification of the risk is the main objective of investing in a mutual fund. Diversified portfolios are created by mutual fund investments and fund managers take different level of risk in order to get maximum value from their investments. Therefore, when comparing and evaluating the investments, returns are measured by taking into account the risks involved in achieving the returns.

The global crises appeared in America in 2008 and later spread to other countries, affecting mainly the economies of Europe and America and their financial markets dramatically. The American and European economies went into recession and some major financial investment banks collapsed, such as Lehman Brothers. Also, in Europe, banking crises happened in many countries led by Portugal, Ireland, Spain, Greece, and Italy. This situation caused to lose of credibility of America and Europe in the eyes of investors and making investors turn towards other stock markets for investment purposes. To minimize the influence of the recession, the FED applied quantitative easing policy between December 2008 and October 2014. The FED bought huge quantities of government bonds and bills from the markets to enhance the money supply for the sake of encouraging the revival of the economy. Quantitative easing policy separates four terms QE1 (December 2008- June 2010), QE2 (November 2010- June 2011), QE3 (September 2012- October 2014) and finally QE4 (January 2013- October 2014). (Useconomy, 2014). During the period, huge amount of money inflow from developed countries to

developing countries experienced. Hence, in this paper, Indian equity funds are tried to analyze over the period from January 2009 to 31 October 2014 during the quantitative easing era. India is known one of the emerging markets and over the study period of 5 years-10 months; Indian CNX500 price index grew by 20.9% compounded annually on average. In the sample period, developed market indices S&P500, DAX, FTSE 100, CAC 40 yielded 15.1%, 12.1, 6.8% and 4.1% respectively. Indian CNX500 price index performed better performance than developed markets.

2. Literature Review

Beginning from the 1960s, there have been several studies carried out on mutual fund performance. Treynor (1965), Sharpe (1966) and Jensen (1968) are among those who measure fund performance related to risk and return measurements. Sharpe (1966) measured 34 open-ended mutual funds between 1954-1963 using the Sharpe ratio and Treynor ratio. As the result of the study, it has been found out that while 11 funds out of 34 show a better performance than the index, 23 funds underperform their benchmarks. Jensen (1968) examined 115 mutual funds - which were active between 1945-1964 – by using an alpha indicator that he generated. His alpha indicator shows the selectivity skills of fund managers. Based on his results, funds could not outperform the market performance, revealing that mutual fund managers, in general, did not have selective ability.

McDonald (1973) computed mutual funds invested between 1964 and 1969 by using the Treynor, Sharpe and Jensen measures. The study showed that there was a positive correlation between risk and return. Malkiel (1995) used the Jensen method to calculate the performance of American funds between the years 1972 and 1990. He revealed that mutual funds could not show positive excess return.

Dahlquist, Engström and Söderlind (2000) evaluated 201 Swedish mutual funds – including only domestic funds - from the period between 1993 and 1997. They found that regular equity funds seemed to over perform while bond and money market funds performed less. Furthermore, actively managed funds demonstrated better performance than passively managed funds.

With the aim of detecting the market timing ability of the fund managers, Treynor and Mazuy (1966) established the quadratic regression analysis method. They applied this method to 57 open-end mutual funds (25 growth funds and 32 balanced funds). They revealed only a single fund as having statistically significant market timing ability.

Henriksson and Merton (1981) and Henriksson (1984) developed both parametric and nonparametric statistical models to the test market timing ability of portfolios. Having been introduced by Henriksson and Merton (1981), the parametric and non-parametric tests in question were applied by Henriksson (1984) to evaluate the market timing ability of 116 open-end funds between 1968 and 1980 in the U.S. market. The results revealed that there wasn't any support for market timing ability. Moreover, Henriksson found an inverse relationship between selection ability and market timing ability.

Chang and Lewellen (1984) tested the market timing ability of 67 U.S. funds covering the period from 1971 to 1979 by using the Henriksson & Merton (1981) method. It was found that there were weak indications of fund manager market timing ability.

Gallo and Swanson (1996) tested 37 U.S. mutual funds by using the Treynor & Mazuy model for market timing, yet found no evidence of market timing of funds.

Christensen (2005) evaluated 47 Danish funds between January 1996 and June 2003. He found that fund managers did not have selectivity skills in general and, in terms of timing ability, the results were also negative, due to the fact that only two funds had significant timing ability.

In India, Sapar and Madava (2003) evaluated the performance of Indian Mutual Fund Schemes during the bear market between September 1998 – April 2002 using the Treynor, Sharpe, and Jensen methods, the Relative Performance Index (RPI), a risk-return analysis and Fama's measure. Of 269 schemes, 49 under performed, 102 were performed on par and 118 outperformed the market.

Sharad and Ranganatham (2005) evaluated Indian funds and separated them into public sector sponsored funds and private sector sponsored funds over a period between May 2002 and May 2005. They found that both funds did not differ statistically in terms of mean returns; whereas there were statistically significant differences between both funds in respect to average standard deviation, average variance, coefficient of variation (VAR) and residual variance (RV). Furthermore, RV had a direct impact on the Sharpe fund performance measure.

Rao (2006) computed 21 Growth plans and 21 Dividend plans in India during the period between April 2005 and March 2006. The study covered a 12-month period when the Indian stock market was generally bullish. The results showed that Growth funds were better than Dividend funds.

Duggimpudi, Abdou and Zaki (2010) evaluated the performance of 17 equity-diversified mutual funds in the Indian market over the last ten years. Two different overlapping period samples between 2000 and 2009 and between 2005 and 2009 were used. In this study, the Sharpe, Treynor and Jensen's alpha methods were applied and the results showed that 17 funds outperformed the markets.

Prajapati and Patel (2012) analyzed the mutual funds over the period from 2007 to 2011. According to their results, all funds demonstrate positive result during the period.

3. Methodology

3.1.Methodology

In this study, it is tried to evaluate the performance of Indian equity funds. A total of 12 equity funds performances' are analyzed. In order to evaluate fund performance, the Sharpe (1966), Treynor (1965) and Jensen's alpha (1968) ratios are computed. Jensen's alpha method also shows the selectivity skills of fund managers. In order to test mutual fund managers' market timing ability, the Treynor & Mazuy (1966) is applied.

3.2.Treynor Ratio

According to Kouris et al. (2011), the Treynor ratio is developed by Treynor in 1965 is the first measurement of mutual fund performances. It is calculated as the ratio of the excess return of the mutual fund divided by its beta (systematic risk) and is defined as:

$$T_i = (R_p - R_f) / \beta_P \quad (1)$$

where

T_i = Treynor's performance index

R_p = portfolio's return in a time period

R_f = risk-free rate of return in a time period

β_P = beta of the portfolio

3.3.Sharpe Ratio

According to Noulas &Lazaridis (2005), the Sharpe technique was settled in 1966 and is fairly similar to the Treynor technique. However instead of beta of the portfolio, Sharpe technique uses the standard deviation of the fund in its denominator. This technique computes the risk premium earned per unit of the total risk. The Sharpe value is calculated as below:

$$S_p = (R_p - R_f /) \sigma_p \quad (2)$$

where

S_p = Sharpe Ratio

R_p = the average rate of return for a fund

R_f = the average risk-free return

σ_p = the standard deviation of the fund.

The Sharpe ratio (S_p) calculates the performance of its level of total risk. If the result of Sharpe ratio is higher, fund shows higher performance. (Duggimpudi, et. al., 2010).

3.4.Jensen's Alpha

As Jensen explained, "a portfolio manager's *predictive ability* – that is, his ability to earn returns through the successful forecast of security prices that are higher than those which we could presume given the level of his riskiness of his portfolio" (Jensen, 1968, p. 389)

Jensen's model can be written as:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p (R_{mt} - R_{ft}) + e_{pt} \quad (3)$$

α_p = the excess return on the portfolio after adjusting for the market

R_{pt} = the return on the portfolio p at time t

R_{ft} = the return on a riskless asset at time t

R_{mt} = the return on the market portfolio at time t

β_p = the sensitivity of the excess return on the portfolio t with the excess return on the market.

The sign of the alpha displays whether the portfolio manager are superior to the market after adjusting for risk. A positive alpha denotes better performance relative to the market, and a negative alpha designates poorer performance. (Mayo, 2011).

3.5.Treynor&Mazuy Regression Analysis

Investment managers may well beat the market, if they are able to adjust the composition of their portfolios in time when the general stock market is going up or down. That is, if fund managers believe the market is going to drop, they alter the composition of the portfolios they manage from more to less volatile securities. If they think the market is going to climb, they shift in the opposite direction. (Treynor&Mazuy, 1966).

Mutual fund managers may hold a higher proportion of the market portfolio if they are qualified to predict future market conditions and envisage the stock market as a bull market. On the other hand, mutual fund managers may hold a lower proportion of the market portfolio if they expect the market to underperform in the future. Treynor and Mazuy (1966) developed the following model to evaluate market-timing performance:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_{i,0}(R_{m,t} - R_{f,t}) + \beta_{i,1}(R_{m,t} - R_{f,t})^2 + \varepsilon \quad (4)$$

where α_i is the timing-adjusted alpha, which represents the timing-adjusted selective ability of mutual fund managers. The quadratic term in equation (4) is the market timing factor and the coefficient of the market timing factor, $\beta_{i,1}$, represents mutual fund managers' market timing ability. If $\beta_{i,1}$ is positive, mutual fund managers have superior market timing ability i.e., the investment portfolios of mutual funds are adjusted actively to well-anticipated changes in market conditions. A negative $\beta_{i,1}$implies that mutual fund managers do not exhibit market timing ability. (Chen et al., 2013).

3.5.Statistical Properties

In order get reliable result; we need to check whether the model satisfies OLS assumptions. It is important to find to be best linear assumptions, which shows the lowest possible mean squared error, when applying OLS with the aim of estimating parameters. If tests show autocorrelation or heteroskedasticity within the regression, as a consequence the results will no longer be considered BLUE. Therefore, adjustments of data will be needed in order to obtain efficient and reliable estimators. In this study, Breusch-Pagan test is applied for heteroscedasticity and Breusch-Gdfrey test is applied for autocorrelation .

3.6.Heteroscedasticcity Test

When the variance of the errors are not constant and finite, var(et) ≠ σ2 this will be of concern in the application of regression analysis, as the presence will make the statistical tests invalid. The case with heteroskedasticity will as a fact not imply biased OLS estimators, but will involve biased residuals. Consequently, the data will provide deceiving standard errors and our inferences might not be a correct. (Kolobaric&Khatabakhsh, 2012). In this study, it is applied Breusch-Pagan test. The Breusch-Pagan test is designed to detect any linear form of heteroskedasticity. In order to test whether this assumption holds, the following hypothesis should be tested:

Null Hypothesis: There is no heteroskedasticity (homoscedasticity)

Alternative Hypothesis: There is heteroscedasticity

3.7.Autocorrelation Test

There are several test for autocorrelation, but the most commonly are used the Durbin-Watson and the Breusch Godfrey test. In this study, it is used the Breusch Godfrey test instead of the Durbin-Watson test, because the Durbin-Watson test is used for the first order serial correlation, whereas the Breusch-Godfrey test is used for higher order serial correlation. Autocorrelation represents the similarity of a time series and a lagged version of itself. This assumption states that the errors should be uncorrelated in the time series regression. In statistical terms the model states that: Corr (ut,us|X) = 0, for all t≠s. In order to test whether this assumption holds, the following hypothesis should be tested:

Null Hypothesis: No serial correlation

Alternative Hypothesis: Serial correlation (autocorrelation)

3.8.Data

In this study, the mutual fund performances of 12 Indian equity funds are analyzed using the Sharpe (1966), Treynor (1965) and Jensen's alpha (1968) ratios. Jensen's alpha also displays the selectivity skills of fund managers. In order to test mutual fund managers' market timing ability, the Treynor&Mazuy (1966) method is applied. The time period is between January 2009 and October 2014. Weekly returns of funds are used and 304 weeks are observed for this study. All data are taken from the Thomson Reuters DataStream.

3.9.Selection of Equity Funds

According to the Investment Institute Database (2014:Q3), there are 728 mutual funds in India. "Indian mutual funds have different types of mutual fund schemes such as open-ended, close ended, interval (based on structure), growth/equity, income, balanced and money market schemes (based on investment objectives). There are also other schemes such as tax saving schemes, special schemes that provide the needs of the financial position, risk tolerance and return expectations." (Duggimpudi et al., 2010, p.77). In this study, only growth/equity funds are considered because they carry risk and should be invested with at least 65% equity or equity-related securities. Of these funds, only equity funds that are managed by the largest asset management companies and have a net asset value of more than 1 billion rupees are analyzed. In the study period, it was disregarded if a fund was closed, newly established or had merged with another fund. Funds that had less than 65% equity shares in their portfolio were also not considered. In total, 12 equity funds were left to work with. Tables 1 and 2 indicate the net asset value of investment fund companies and the equity shares of the selected funds, respectively.

Table 1. Net Asset Value of Investment Fund Companies in India

Mutual Fund Company	Assets Under Management (rupee)
HDFC Mutual Fund	14.183.476.070
ICICI Prudential Mutual Fund	12.776.072.850
Reliance Mutual Fund	12.338.634.120
Birla Sun Life Mutual Fund	10.269.015.040
UTI Mutual Fund	8.324.991.040
SBI Mutual Fund	7.353.032.480
IDFC Mutual Fund	4.585.077.130
DSP BlackRock	3.865.156.590
Tata Mutual Fund	2.454.383.580
L & T Mutual Fund	2.067.270.560
Sundaram Mutual	1.894.355.510
Religare Invesco Mutual Fund	1.766.735.330

This table is taken from https://www.baanmoney.com/mutual_funds/rankings and

https://www.amfiindia.com/net-asset-value

Table 2. Indian Equity Funds

Fund Name
ICICI Prudential Dynamic Plan Growth
UTI Equity Growth Fund
Religare Invesco Growth Fund
L&T Equity Growth
HDFC Equity Growth
DSP Blackrock Equity Growth
SBI Magnum Equity Growth
Reliance Growth Fund
Tata Pure Equity Growth
Birla Sun Life Equity Growth
IDFC Equity Fund
Sundaram Growth Fund

3.10.Returns on Funds

Logarithmic returns of funds were computed over weekly price indices of funds. For the study, 304 weeks of data between January 9, 2009 and October 31, 2014 are used.

$$R_p = ln\ (P_t / P_{t-1)} \quad (6)$$

where

R_p = return on the fund

P_t = price of the fund at week *t*

P_{t-1} = price of the fund at week *t-1*

3.11.Benchmark

In this study, the CNX500[1] price index is used as a benchmark. A weekly return of the CNX500 is used.

$R_m = ln\ (P_{mt} / P_{mt-1})$

where

R_m = returns on the JSE

P_{mt} = value of the CNX500 Price Index on week t

P_{mt-1} = value of the CNX500 Price Index on week t-1

3.12.Risk-free Rate

In this study, 364-Day T-bills are used as a risk-free rate and are sourced from the Thomson Reuters DataStream. Prajapati & Patel (2012) used the same measures in their studies.

[1] The CNX Index represents about 96.42% of the free float market capitalization of the stocks listed on the National Stock Exchange on June 30, 2014. http://www.nse-india.com

4. Empirical Results

4.1.Descriptive Statistics of Indian Funds

Descriptive statistics of Indian equity funds, benchmarks and risk-free rates are given in Table 3. The average column indicates returns on funds, benchmarks and risk-free rates. Other than the Sundaram Growth Fund and the Indian 1-Year T-Bill, the average returns of all funds are higher than the CNX500 price index. The Skew column displays the skew of equity funds and the corresponding value of their benchmarks. All funds and benchmark are negatively skewed which denotes a distribution with an asymmetric tail extending toward more negative values. Only the 1-Year T-Bill is skewed positively, which indicates a distribution with an asymmetric tail extending toward more positive values. All funds and benchmarks have positive kurtosis, which infers typical heavy tailed financial distributions and risk-free rate has negative kurtosis, which implies a relatively flat distribution. The R column depicts the correlation between funds and their benchmarks. The average correlation of funds and their benchmarks is 0.95925, which means that there is a strong positive correlation. The L & T Equity Growth Fund has the highest correlation (0.98080) and the Religare Invesco Growth Fund has the lowest correlation (0.90691). The Standard Deviation column shows volatility of equity funds, benchmarks and risk-free rates. Standard deviation of the HDFC Equity Growth Fund, the Sundaram Growth Fund and the Birla Sun Life Equity Growth Fund are higher than the CNX500, which makes them more volatile than their benchmark. The last column exhibits betas of equity funds, which measure the systematic risks of the funds. All funds' betas are less than 1, implying that all 12 funds carry less risk compared to the benchmark CNX500 index.

Table 3: Descriptive Statistics of Indian Funds

Fund Name	Average	Skew	Kurtosis	R	Std, dev,	Beta
Birla Sun Life Equity Growth	0,00386	0,5152	4,41315	0,97728	0,02849	0,98023
DSP Blackrock Equity Growth	0,00394	0,67331	4,38487	0,94923	0,02626	0,87807
HDFC Equity Growth	0,00455	0,43879	3,74740	0,96286	0,02907	0,9857
ICICI Prudential Dynamic Plan Growth	0,00411	0,20379	1,70031	0,95479	0,02149	0,72296
IDFC Equity Fund	0,00346	0,55093	3,17477	0,93411	0,0282	0,92766
L & T Equity Growth	0,00411	0,37458	2,39007	0,9808	0,0244	0,84316
Reliance Growth Fund	0,00393	0,53665	4,62021	0,95508	0,02804	0,94332
Religare Invesco Growth Fund	0,00358	0,44458	2,33631	0,90691	0,01884	0,6023
SBI Magnum Equity Growth	0,00392	0,90585	6,72613	0,96966	0,0261	0,89136
Sundaram Growth Fund	0,0029	0,12332	2,50491	0,97365	0,02857	0,97924
Tata Pure Equity Growth	0,00358	0,49361	4,08968	0,97107	0,02448	0,83726
UTI Equity Fund-Growth	0,00421	0,3432	1,55537	0,97558	0,02297	0,78954
CNX 500	0,0034	0,495	3,75628		0,0284	
Indian T-Bill 1 year	0,00134	-0,80741	-0,7711		0,00031	

4.2. Results of the Sharpe Ratio for India

Table 4 shows the performance of the Sharpe ratio. A higher Sharpe ratio implies that funds have a better performance. The ICICI Prudential Dynamic Plan Growth, the UTI Equity Fund Growth and the Religare Invesco Growth Fund have the highest Sharpe ratios. The Sundaram Growth Fund, the IDFC Equity Fund and the Birla Sun Life Equity Growth have the lowest Sharpe ratios.

Table 4. Results of the Sharpe Ratio for India

Fund Name	Sharpe	Rank
ICICI Prudential Dynamic Plan Growth	0.12902	1
UTI Equity Growth Fund	0.12477	2
Religare Invesco Growth Fund	0.11899	3
L&T Equity Growth	0.11353	4
HDFC Equity Growth	0.11031	5
DSP Blackrock Equity Growth	0.09891	6
SBI Magnum Equity Growth	0.09866	7
Reliance Growth Fund	0.09249	8
Tata Pure Equity Growth	0.09139	9
Birla Sun Life Equity Growth	0.08827	10
IDFC Equity Fund	0.07528	11
Sundaram Growth Fund	0.05465	12

4.3. Results of Treynor Ratio for India

Table 5 displays the performance of the Treynor ratio. A fund with a higher Treynor ratio indicates that the fund has a better risk-adjusted return compared to a fund with a lower Treynor ratio. A higher Treynor ratio implies that funds have better performances. The ICICI Prudential Dynamic Plan Growth, the UTI Equity Fund Growth and the Religare Invesco Growth Fund have the highest Treynor ratios. The IDFC Equity Fund, the Birla Sun Life Equity Growth and the Sundaram Growth Fund have the lowest Treynor ratios.

Table 5. Results of the Treynor Ratio for India

Fund Name	Treynor	Rank
ICICI Prudential Dynamic Plan Growth	0.00384	1
Religare Invesco Growth Fund	0.00372	2
UTI Equity Fund-Growth	0.00363	3
L&T Equity Growth	0.00329	4
HDFC Equity Growth	0.00325	5

Table 5. Continue

DSP Blackrock Equity Growth	0.00296	6
SBI Magnum Equity Growth	0.00289	7
Reliance Growth Fund	0.00275	8
Tata Pure Equity Growth	0.00267	9
Birla Sun Life Equity Growth	0.00257	10
IDFC Equity Fund	0.00229	11
Sundaram Growth Fund	0.00159	12

4.4. Results of Jensen's alpha for India

Table 6 shows the results of Jensen's alpha measure that indicates the selectivity skills of fund managers. Fund managers have either a higher performance or a lower performance relative to the market. Eleven of the 12 funds have positive alphas and among them 7 are statistically significant. The DSP Blackrock Equity Growth is statistically significant at the 10% level; the Religare Invesco Growth Fund and SBI Magnum Equity Fund are statistically significant at the 5% level; the ICICI Prudential Dynamic Plan Growth, the UTI Equity Fund Growth, the Religare Invesco Growth Fund and the L & T Equity Growth Fund are statistically significant at the 1% level. Only the Sundaram Growth Fund has a negative alpha. It can be interpreted that Indian fund managers, in general, had selectivity skills during the quantitative easing era term. Test results of heteroskedasticity and autocorrelation are available on Table 7.

Table 6. Results of Jensen's alpha for India

Fund Name	Jensen's alpha	t-stat	p-value
ICICI Prudential Dynamic Plan Growth***	0,00129	3,49453	0,00055
UTI Equity Growth Fund***	0,00124	4,27385	0,00003
HDFC Equity Growth***	0,00118	2,60977	0,00951
L & T Equity Growth***	0,00104	3,77797	0,00019
Religare Invesco Growth Fund**	0,001	2,19174	0,02916
DSP Blackrock Equity Growth*	0,00079	1,66388	0,09717
SBI Magnum Equity Growth**	0,00074	2,01898	0,04437
Reliance Growth Fund	0,00065	1,36660	0,17277
Tata Pure Equity Growth	0,00052	1,53034	0,12698
Birla Sun Life Equity Growth	0,0005	1,43494	0,15234
IDFC Equity Fund	0,00022	0,37198	0,71017
Sundaram Growth Fund	-0,00045	-1,20616	0,2287

Significance levels: * indicates 10%, ** indicates 5%, *** indicates 1%

Table 7 indicates the results of heteroskedasticity test (Breusch-Pagan), autocorrelation test (Breusch Pagan Serial Correlation) and normality test (Breusch Pagan. Heteroscedasticity test assumption means that there is no constant variance. If the p-value is smaller than %5 level; then we reject the null hypothesis and there is heteroscedasticity. P-values of DSP Blackrock Equity Growth, HDFC Equity Growth, Reliance Growth Fund and SBI Magnum Equity Growth are smaller than %5 levels. For autocorrelation test, this test indicates that the errors should be uncorrelated in the time series regression. If the p-value is smaller than %5 level; then we reject the null hypothesis and there is serial correlation. P-values of Birla Sun Life Equity Growth, IDFC Equity Fund and Tata Pure Equity Growth are smaller than %5 levels.

Table 7: Test Results for Jensen's alpha		
	Heteroskedasticity Test	Autocorrelation Test
	Breusch-Pagan	Breusch-Godfrey Serial Correlation
	p-value	**p-value**
Birla Sun Life Equity Growth	0,6362	0,0363*
DSP Blackrock Equity Growth	0,0150*	0,1352
HDFC Equity Growth	0,0283*	0,3353
ICICI Prudential Dynamic Plan Growth	0,4045	0,0329
IDFC Equity Fund	0,1134	0,0000*
L&T Equity Growth	0,0508	0,4656
Reliance Growth Fund	0,0123*	0,3095
Religare Invesco Growth Fund	0,2561	0,5208
SBI Magnum Equity Growth	0,0001*	0,0802
Sundaram Growth Fund	0,9202	0,0617
Tata Pure Equity Growth	0,1461	0,0282*
UTI Equity Growth Fund	0,2729	0,2137
Significance levels: * indicates %5 level		

4.5.Results of the Treynor & Mazuy Regression Analysis for India

The Treynor & Mazuy (1966) analyzes the market timing ability of fund managers. If fund managers believe that the market is going up, they change their portfolio composition from less volatile to high volatile securities. When the market is going down, they shift their portfolio composition from high volatile to less volatile securities. If fund managers have market timing ability, they create their portfolios according to their estimates of the tendency of the markets. Table 7 denotes the results of the Treynor & Mazuy (1966) method. Eight out of the 12 funds have positive results, but only the SBI Magnum Equity Growth is both positive and statistically significant at the 1% level. The ICICI Prudential Dynamic Plan Growth is statistically significant at the 10% level and the Sundaram Growth Fund is statistically significant at the 1% level. Consequently, fund managers did not have market timing ability during the quantitative easing policy era. Four funds have a negative market timing ability. Test results of heteroskedasticity and autocorrelation are available on Table 9.

Table 9 indicates the results of heteroskedasticity test (Breusch-Pagan), autocorrelation test (Breusch Pagan Serial Correlation) and normality test (Breusch Pagan. Heteroscedasticity test assumption means that there is no constant variance. If the p-value is smaller than %5 level; then we reject the null hypothesis and there is heteroscedasticity. P-values of Birla Sun Life, DSP Blackrock, HDFC Equity Growth, ICICI Prudential Dynamic, L&T Equity Growth, Reliance, Religare Invesco, SBI Magnum, Sundaram and UTI Equity are smaller than %5 levels. For autocorrelation test, this test indicates that the errors should be uncorrelated in the time series regression. If the p-value is smaller

than %5 level; then we reject the null hypothesis and there is serial correlation. P-values of Birla Sun Life, ICICI Prudential, IDFC Equity, L&T Equity, SBI Magnum and Tata Pure Equity are less than %5 levels.

Table 8. Results of the Treynor & Mazuy Regression Analysis for India

Fund Name	T&M	t-stat	p-value
SBI Magnum Equity Growth***	0,72864	3,97980	0,00009
DSP Blackrock Equity Growth	0,31648	1,30499	0,19289
Tata Pure Equity Growth	0,12662	0,73637	0,46208
IDFC Equity Fund	0,10798	0,36448	0,71575
Birla Sun Life Equity Growth	0,09274	0,52213	0,60196
Reliance Growth Fund	0,08542	0,3493	0,72711
HDFC Equity Growth	0,07225	0,31284	0,75462
Religare Invesco Growth Fund	0,02882	0,12324	0,902
L & T Equity Growth	-0,21318	-1,52602	0,12805
UTI Equity Fund Growth	-0,23444	-1,58402	0,11424
ICICI Prudential Dynamic Plan Growth*	-0,34777	-1,85942	0,06394
Sundaram Growth Fund***	-0,68809	-3,66860	0,00029

Significance levels: * indicates 10%, ** indicates 5%, *** indicates 1%

Table 9: Test Results for Treynor&Mazuy Regression Analysis		
	Heteroskedasticity Test	**Autocorrelation Test:**
	Breusch-Pagan	**Breusch-Godfrey Serial Correlation**
	p-value	**p-value**
Birla Sun Life Equity Growth	0,0045*	0,0433*
DSP Blackrock Equity Growth	0,0004*	0,5946
HDFC Equity Growth	0,0362*	0,4851
ICICI Prudential Dynamic Plan Growth	0,0078*	0,0142*
IDFC Equity Fund	0,113	0,0000*
L&T Equity Growth	0,0000*	0,0194*
Reliance Growth Fund	0,0000*	0,3253
Religare Invesco Growth Fund	0,0000*	0,633
SBI Magnum Equity Growth	0,0025*	0,0448*
Sundaram Growth Fund	0,0144*	0,0604
Tata Pure Equity Growth	0,0833	0,0273*
UTI Equity Growth Fund	0,0000*	0,3069
Significance level: * denotes %5 level		

5. Conclusion

In this study, Indian equity funds performances' are analyzed over the period from 09 January 2009 to 31 October 2014. During this quantitative easing policy term, Fed increased money supply in order to lower the interest rates and

this excess of money in financial markets made a significant contribution to capital influx from developed countries to developing countries. The study period coincides with the QE era when stock market sizes have improved extremely. India is considered as one of the developing markets and during the study period 5 years-10 months, Indian CNX500 price index stock market surpassed developed stock market indices. Indian equity funds' performances were analyzed in this study by using Sharpe ratio (1966), Treynor ratio (1965), Jensen alpha (1968) and Treynor&Mazuy (1966) regression analysis method. In order to find fund performances, it has been utilized Sharpe (1966) and Treynor (1965) ratio. Higher Sharpe and Treynor ratio imply funds have better performances. In general, these risk-adjusted performance ratios give similar rankings of mutual funds. ICICI Prudential Dynamic Plan Growth, UTI Equity Growth Fund, Religare Invesco Growth Fund have the highest ratios for both. Jensen's alpha (1968), Treynor&Mazuy (1966) regression analysis method is used for determining selectivity skills and market timing ability of fund managers, respectively. In this work, it is revealed that in the era of quantitative easing, Indian fund managers had selectivity skills, because 7 of the 12 funds are positively statistically significant. On the other hand, Furthermore, Treynor&Mazuy (1966) regression analysis shows that over the same period fund managers did not also have market timing ability. For Treynor&Mazuy regression analysis (1966), solely SBI Magnum Equity Growth Fund is statistically significant. It can be deduced that although Indian fund managers had selectivity skills, but they did not have market ability in the era of quantitative easing. In future, this study can be developed using persistence analysis. To the best of knowledge this is the first study that considers how Indian funds performed in the recent quantitative easing era.

References

Association of mutual funds in India. (2014), "Net asset value of Indian mutual funds", available at https://www.amfiindia.com/net-asset-value (accessed 22 October 2014).

Baan Money. (2014), "Mutual fund rankings" available at https://www.baanmoney.com/mutual_funds/rankings (accessed 21 October 2014).

Cesari, R., & Panetta, F. (2002). "The performance of Italian equity funds", Journal of Banking and Finance, 26(1), 99-126.

Chang, E., & Lewellen, W. (1984), "Market timing and mutual funds investment performance", Journal of Business, 57, 57-72.

Chen, D., Gan, C., & Hu, B. (2013), "An empirical study of mutual funds performances in China", available at http://ssrn.com/abstrat=2220323 (accessed 15 November 2014)

Christensen, M. (2005), "Danish mutual fund performance: Selectivity, market timing and persistence", Working Paper, Department of Accounting, Finance and Logistics, Aarhus School of Business, 1-37.

Dahlquist, M., Engström, S., & Söderlind, P. (2000), "Performance and characteristic of Swedish mutual funds. Journal of Financial and Quantitative Analysis, 35, 409-423.

Deepak, A. (2011), "Measuring Performance of Indian Mutual Funds", available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1311761 (accessed 15 November 2014).

Duggimpudi, R. R., Abdou, H. A., & Zaki, M. (2010), "An investigation of equity diversified mutual funds: The case of Indian market", Investment Management and Financial Innovations, 7(4), 77-84.

Gallo, J. G., & Swanson, P. E. (1966), "Comparative measures of performances for U.S. – based internationally equity mutual funds. Journal of Banking and Finance," 20, 1636-1650.

Henriksson, R. D. (1984), "Market timing and mutual fund performance: An empirical investigation". The Journal of Business, 57(1), 73-96.

Henriksson, R.D., & Merton, R.C. (1981), "On market timing and investment performance. II. Statistical procedures for evaluating forecasting skills", The Journal of Business, 54(4), 513-533.

Investment company institute (ICI) (2015), "Unit investment data", http://www.ici.org/research/stats (accessed 15 February 2015).

Jensen, M.C. (1968), "The performance of mutual funds in the period 1945-1964", The Journal of Finance, 23(2), 389-416.

Kolobaric, A. & Khatabakhsh, P. (2012), "Performance of hedge funds in the European market". Unpublished master's thesis. Lund University School of Management, Sweden, Lund.

Kouris, A., Beneki, C., Adam, M., & Botsaris, C. (2011), "An assessment of the performance of Greek mutual equity funds selectivity and market timing", Applied Mathematics Sciences, 5(4), 159-171.
Malkiel, B. G. (1995), "Returns from investing in equity funds: 1971-1991", Journal of Finance, 50, 549-572.
Mayo, H. B. (2011), Introduction to Investments (10th. edition), Southwestern Cengage, Mason, USA.
McDonald, J.G. (1973), "French mutual fund performance: Evaluation of internationally-well diversified portfolios", The Journal of Finance, 28(5), 1161-1180.
Noulas, G., Papanastation, J. A., & Lazaridis, J. (2005), "Performance of mutual funds", Managerial Finance, 3(12), 101-112.
Prajapati, K. P., & Patel, M. K. (2012), "Comparative study on performance evaluation of mutual fund schemes of Indian companies", Journal of Arts, Sciences & Commerce, 3(3), 47-59.
Rao, D. N. (2006), "Investment Styles and Performance of Equity Mutual Funds in India", available at http://ssrn.com/abstract=922595 (accessed 15 November 2014).
Sapar, N. R. & Madava, R. (2003), "Performance evaluation of Indian mutual funds, available at http://ssrn.com/abstract=433100 or http://dx.doi.org/10.2130/ssrn.433100. (accessed 12 January 2015).
Sharad, P. & Ranganatham, M. (2005), "Characteristics and performance evaluation of selected mutual funds in India", available at http://ssrn.com/abstract=876402 or http://dx.doi.org/10.2139/ssrn.876402 (accessed 16 November 2014).
Sharpe, W.F. (1966), "Mutual fund performance", Journal of Business, 34, 119-138.
The National Stock Exchange. (2014), "CNX500 Price Index", available at http://www.nseindia.com/products/content/equities/indices/cnx_500.htm (accessed 25 October 2015).
Treynor, J.L. (1965), "How to rate management of investment funds", Harvard Business Review, 43(1), 63-75.
Treynor, J.L., & Mazuy, K.K. (1966), "Can mutual funds outguess the market?", Harvard Business Review, 44, 131-136.
"What is quantitative easing? Definition and explanation", available at http://useconomy.about.com/od/glossary/g/Quantitative-Easing.htm (accessed 23 January 2015).

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PAIRS TRADING TO THE COMMODITIES FUTURES MARKET USING COINTEGRATION METHOD

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Abstract:

This paper investigates pairs trading strategy by using the cointegration method among the 10 most popular agricultural future markets. It is found that only in 2 pairs shows trading signal. The pairs trading strategy is performed in two stages that are the formation period and the trading period with daily futures data from 2004 to 2015. After the formation period was constructed, it is assumed that the cointegration error continues to hold the trading period same as it does for the formation period. The pairs trading strategy is created by the long position cotton and the short position coffee and also long position cotton and short position the livecattle. It is found that the profitability of this strategy worked well in both formation period and trading period.

Keywords: *Pairs Trading, Cointegration Approach, Futures Market, Commodities, Statistical Arbitrage*

1. Introduction:

The Pairs trade, also known as a statistical arbitrage strategy or a convergence trading strategy, is a market neutral trading strategy. The conception of pairs trading is the simultaneous buying and selling two historically correlated securities. This investment strategy requires buying the under-valued security (long position) while short selling (short position) the over-valued security, thus keeping the market neutrality (Vidyamurthy, 2004).

Jesse Livermore, the most famous trader of all time, was the first pairs trader in the late 1800s. Livermore's strategy was to monitor "sister stocks", or two similar stocks in the same industry (Ehrman, 2006). In 1980s, Nunzio Tartaglia, a quantitative analyst, gathered a team of physicists, mathematicians and computer scientists to reveal arbitrage opportunities in the equity markets. Tartaglia's team developed high tech trading programs by using complex statistical methods. The first objective of Tartaglia's trading programs was to select pairs of securities whose prices tended to move together (Gatev, Goetzmann, and Rouwenhorst, 1998). Tartaglia's team had been very successful in trading these pairs in 1987, but in 1989, after two years of bad performance, Morgan Stanley halted its operation. Despite of a couple of bad years of performance, the pairs trading became a very popular market-neutral strategy among individuals and institutional traders as much as hedge funds.

In this paper, the profitability of pairs trading strategy is studied by using Johansen cointegration method in the commodities future market over the period of 2004-2015. In the academic literature, in order to apply pairs trading strategy, interestingly, neither cointegration method nor commodities future markets have received little attention. This study, first, seeks to identify pairs of commodities by using Johansen's Test for cointegration and then in this study the pair of commodities is modeled by using the Vector Error Correction Modeled (VECM). The VECM model obtained from residual series plays a primary role to implementing a pairs trading strategy.

This paper proceeds as follows. The next section reviews the literature. Section 3 describes the data and methodology, Section 4 reveals empirical results and trading strategies. Section 5 summarizes and concludes the paper.

2. Literature Review

There are four main methods to implement the pairs trading in the academic literature:

1-Distance Trading Method, 2-Stochastic Spread Method, 3-Combine Forecast Method 4-Cointegration Method

2.1-The Distance Method

The distance method, the most common method Gatev et al. (1998, 2006), is one of the most referenced papers in the pairs trading. The study by Gatev *et al.* (1998) has been used in distance-trading approach to test the pairs trade in the U.S. stocks with daily data from the period 1962 to December 1997. Gatev et al. (2006) extended and updated the analysis of 2002. Their first research showed that the average annualized excess return is 12% of top pairs, and concluded that the pairs payoff is not strictly linked to a classical mean reversion effect. Their second research also showed that the average annualized excess returns is 11% for self-financing portfolio of pairs. Abnormal returns are compensation to arbitrageurs for enforcing the "Law of One Price". Do and Faff (2009) replicated the Gatev (1998) methodology with the recent data. They found that the strategy is still profitable but it is declining. Perlin (2009) found that the pairs trading strategy worked well in the Brazilian financial market and also an implementation of pairs trading strategy leads a positive excess return. Broussard and Vaihekoski (2012) used the Finnish stock market data from 1987 to 2008 under different weighting structures and trade initiation conditions. They found that the excess return is 12.5%. Papadakis and Wysocki (2008) examined the impact of accounting information events on the profitability of the pairs trading strategy by using the U.S stock pairs from 1981 to 2006. They found that the drift in stock prices, following earnings announcement and analyst's earning forecast, has a significant effect on the pairs trading. Engelberg, Gao and Jagannathan (2009) analyzed the source of profits from the pairs trading. They found that the profitability of pairs trading is positively related to the way of information spreads across the stocks in the pair and in the frictions that suppress this information flow. Jacobs and Weber (2011) analyzed returns in different information settings by using the data of the U.S. stocks and eight major stock markets from 1960 to 2008. They found that pairs opening on high distraction days generate higher returns than pairs opening on low distraction days. Mori and Ziobrowski (2011) compared the performance of the pairs trading in the U.S. REIT market with the U.S general stock market over the period of 1987 to 2008. They found that the REIT market provided superior profit opportunities between 1993 and 2000 because of special characteristics of REIT and these profits disappeared after 2000. Nath (2003) tested the U.S. Treasury securities. He concluded that the pairs trading strategy produces abnormal returns compared to various benchmarks between 1994 and 2000. Muslumov (2009) did a research about the Istanbul Stock Exchange and found that the average excess return of 5.4% for the top 20 best pairs trading portfolios. Huck (2013) used S&P 500 stocks and demonstrated the high sensitivity of the return to changes in the length of the formation period and that data-snooping bias cannot explain the positive excess return obtained in some cases.

2.2- Stochastic Spread Method

A stochastic approach has been used in the pairs trading by Elliott, Van der Hoek and Malcolm (2005**)** and Do *et al,* (2006), Rampertshammer (2007), Mudchanatongsuk, Primbs and Wong (2008), Herlemont (2008), Bogomolov (2010), Kanamura, Rachev and Fabozzi (2010). Elliot (2005) proposed a mean reverting that is Gaussian Markov chain model for the spread. The appropriate investment decision is based on the predictions of the spread and is calibrated from market observations. Do et al. (2006) investigated the stochastic approach and agreed with the work of Elliot et al. (2005). This model has three major advantages from the point of the empirical perspective. Do et al (2006) suggested that the long term mean of the level differences in two stocks should not be constant and they proposed the stochastic residual spread method to pairs trading. Mudchanatongsuk et al. (2008) offered a stochastic control approach to the problem of pairs trading, obtained the optimal solution to the problem in closed form through Hamilton-Jacobi-Bellman equation and provided closed form maximum likelihood estimation values for the parameters in this model. Kanamura et al. (2010) applied the pairs trading strategy to energy futures market from 2000 to 2008 by using a mean reverting process of the futures price spread. They found that the stable profit can be made with the pairs trading but the profit of cross commodities may not be improved. Bogomolov (2010) investigated all three methods of the pairs trading used by Elliot et al. (2005) -distance trading, stochastic spread and co-integration approach to Australian stock exchange. He found that all three methods showed a good performance before calculating transaction costs but later he saw that transaction costs severely diminished returns of all methods especially the return of the stochastic spread method.

2.3-Combine Forecast Method

The method of combine forecast is described by Huck (2009, 2010). He used multi-criteria decision making methods (MCDM) and neural networks methods to test pairs trading strategy by using S&P 100 stocks. These two methods are based on three stages: 1-forecasting, 2-ranking and 3-trading. The combine forecast method is developed without the reference to any equilibrium model. Huck (2009, 2010) proposed that the method offers much more trading possibilities and could detect the "birth" of the divergence that other methods cannot achieve.

2.4-Cointegration Method

The cointegration approach described by Banerjee (1993), Gilespi and Ulph (2001), Hong and Susmel (2003), Vidyamurthy (2004), Lin, McRae and Gulati (2006), Galenko, Popova and Popova (2007), Schmidt (2008), Puspaningrum (2009), Chiu and Wong (2012). Vidyamurthy (2004) uses the Engle-Granger 2 steps method for co-integration and develops trading strategies based on the assumed dynamics of portfolio. He presented both of a parametric and a non-parametric empirical approaches to conduct his analysis. Lin at al. (2006) developed a procedure that implants a minimum profit condition in the pairs trading strategy. They found that the five-step strategy is feasible for commonly used parameter values. Schmidt (2008) used the Johansen test for cointegration to identify pairs of stock and then mean-reverting residual spread modeled as a Vector-Error-Correction-Model (VECM). He used 17 financial stocks listed on the Australian Stock market dated from 2002 to 2007. Schmidt research did not address to the profitability of the pairs trading strategy. Puspaningrum (2009) tried to find the optimal pre-set boundaries for pairs trading strategy by using the cointegration method. The objective was to develop a quantitative method to assess the average trade duration, the average inter-trade interval and the average number of trades and then at the end of these assessments, the objective is to use them to find the optimal pre-set boundaries. In the term of maximizing the minimum total profit for co-integration error following an AR (1) process, the optimality is improved by assembling the cointegration technique, the cointegration coefficient weighted rule, and the mean first-passage time using an integral equation approach. Chiu at al (2012) investigated the optimal dynamic of the pairs trading strategy of cointegrated assets by using the mean-variance portfolio selection criterion. They suggested that arbitrageurs do not make an investment when cointegration disappears in the market. Thus, the time- consistent optimal trading strategy does not necessarily resemble to either relative value or long-short strategies.

3. Data and Methodology

The data used in the study consists of the daily logarithmic closing prices of Soybean ZS (CBOT), Corn ZC (CBOT), Wheat ZW (CBOT), Rough Rice ZR (CBOT), Oats ZO (CBOT), Live Cattle LE (CME), Lean Hog HE (CME), Cocoa CJ (ICE), Coffee "C" KT (ICE), and Cotton TT (ICE) futures traded on the CBOT, CME and ICE (Figure 2) analyzed.

There is a link between real interest rates and real commodity prices. When the Fed cut interest rates between 2001-2004 and 2008-2011, real commodity prices started to increase. In 2008 and in 2011 commodity prices spiked (Figure 1). After 2014, commodity prices started to decline as an expectation of interest rate rise in 2015 (Figure 2 and 6). This paper addresses to profits of pairs trading strategy when the period of commodity prices peaked in 2008 and 2011, and the strategy is re-tested when commodity prices started to decline. The daily rolling three-month future closing price data is obtained from the Bloomberg database. For each futures security, the nearby futures contract was employed and rollovers into next contract occurred on the last day of the month before contract expiration. Public holidays in different indexes were filled by the last date closing price. The average transaction cost per contract is set to 1 cent (0.5bp) but the transaction costs are ignored. It is assumed that the cointegration vector continues to hold the trading period. The value of the long/short positions for each day was set to $100,000.

The pairs trading strategy is implemented in two stages, which are similar to Gatev et al. (GGR): the formation

period and the trading period. There is no standard rule for deciding the lengths of the formation period and trading period. The formation period needs to be long enough to determine cointegration relationship actually existing, but not so long that there is not enough information left for the analyze for the trading period. The trading period needs to be long enough to have opportunities to open and close trades and test the strategy but it cannot be too long because it is possible that the cointegration relationship between two tested commodities may change. The time period for the formation period and the trading period is covered from December 1st, 2004 to May 1st, 2015. In order to find the maximum number of cointegrated pairs, the whole formation period is divided into 5 sub-periods. The formation period contains 7 years of logarithmic daily data of 1765 observations (1.12.2004-1.12.2011), of 1500 observations, of 1250 observations, of 1000 observations, and of 750 observations. The trading period contains 3.5 years period of 859 observations (2.12.2011-1.05.2015).

Figure 1 (Source: Jeffrey Frankel, HKS)

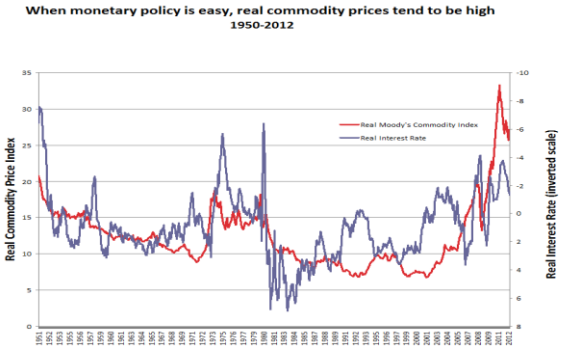
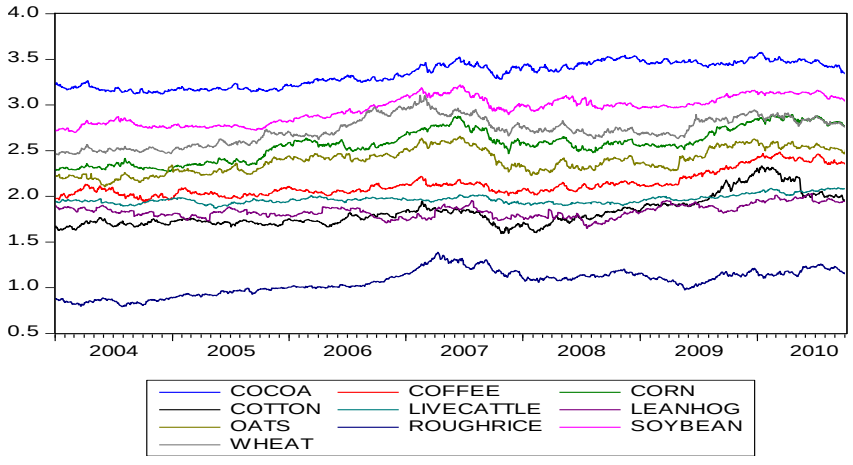


Figure 2



4. Trading Strategies and Empirical Results

4.1. Pairs Selection

The important step of the strategy consists of identifying potential pairs. First, to test for a unit root in the individual price series, the Augmented Dickey-Fuller and Phillips-Perron tests are applied. The ADF and PP unit root test results of the variables in their levels and first difference values are shown in Table 1. All the unit root tests are performed with time trend and intercept (*) and intercept (**), for all variables in their levels; and the tests are performed with their first difference values. The specification of the test regression is automatically selected using the Akaike-criterion. ADF and PP tests for the level data, the null hypothesis is not rejected at the 1% significance, indicating that all variables are not stationary. Using the ADF and PP test, the null hypothesis is rejected for all first difference equations at the 1% level of significance. So according to this test, all variables are I (1) that reach the significant level of %1 in the one lag of data. Second, to test for cointegrated pairs with intercept term, the Johansen test is run for all possible combination of pairs. There are 45 possible pairs. The numbers of cointegrated pairs with 5 sub-periods are represented in table 2. In a first row, there are 7 cointegrated pairs that are Soybean-Wheat, Corn-Oats, Cotton-Coffee, Cotton-Lean Hog, Cotton-Live Cattle, Wheat-Rough Rice, and Lean Hog-Live Cattle are significantly cointegrated in the period between 2004 and 2011 (Table 2 and 3). In the second row with 1500 observations for the data of 2005 to 2011 show that there are 6 cointegrated pairs (cotton-coffee, cotton-livecattle, livecattle leanhog, roughrice-soybean, roughrice-wheat soybean-wheat). In the third row, using 1250 observations, there are 4 cointegrated pairs (cotton-coffee, roughrice-soybean, roughrice-wheat, and soybean-wheat). In the forth row, using 4 years data of 2007 through 2011 with 100 observations, there are only 2 cointegrated pairs (roughrice-wheat, soybean-wheat). In the fifth row, using 3 years data of 2008 through 2011 with 750 observations, there are 2 cointegrated pairs (cotton-coffee, soybean-wheat). These 5 sub-periods indicate that the maximum number of cointegrated pairs is found in the period of between 2004 and 2011.

The integration equations with 1765 observations (2004-2011):

Log Coffee(-1) - 0.6666*Log Cotton(-1) -0.443

Log Corn(-1) -1.0513*Log Oats(-1) +0.308

Log Cotton(-1) -2.5023*Log Live Cattle(-1) +0.003

Log Cotton(-1) -3.9873*Log Lean Hog (-1) +0.002

Log Wheat (-1) -1.4943*Log Soybean(-1) + 0.344

Log Wheat (-1) -1.2731*Log RoughRice(-1) +0.001

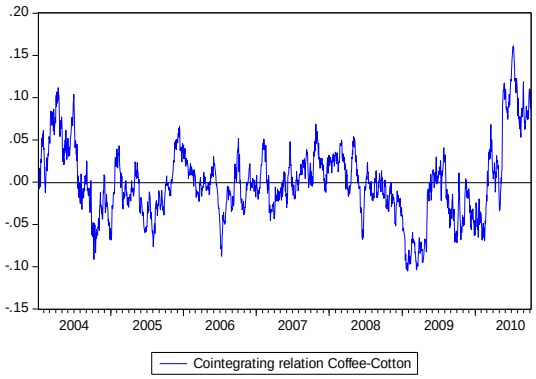
Log LeanHog(-1) -1.2871*Log LiveCattle(-1) -0.626

In the figure 3, two diagrams are illustrated by residuals for coffee/cotton and cotton/liveCattle that both are stationary moving around zero. Even though some periods, for coffee/cotton pair (a), after 2007 and 2011 and for cotton/livecattle pair (b), a period of 2004, 2005 and 2011, it takes quite a long time to return zero. Finally, after

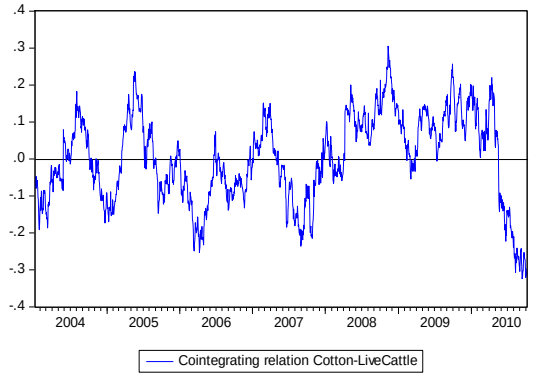
analyzing 7 pairs whether an AR (1) model is fitted or not, only 2 pairs are cointegrated and their cointegration errors are an AR (1) model. The standard deviation of coffee/cotton pair is 0.0493 and the standard deviation of cotton/livecattle is 0.1086.

Figure 3: Plot of Coffee/Cotton and Cotton/Live Cattle Residual Series against Time

a) Plot of C/TT Residual Series



b) Plot of LE/TT Residual Series



4.2. Implementing Pairs Trading Strategy

In order to apply the pairs trading strategy, two trading rules should be followed. The first rule is to set up an upper bound and a lower bound for +-1.5 standard deviation. Second rule, when the cointegration error is higher than or equal to the upper bound (+1.5std deviation) at the time t_0, a trade is opened by selling number of Cotton shares at the time t_0 and by buying number of Coffee shares at the time t_0 and when the cointegration error gets back to its mean at the time t_1, the positions are closed out while short position Coffee and long position Cotton.

In the same strategy applied to the lower bound, when the cointegration error is lower than or equal to the lower bound (-1.5std deviation) at the time t_0, a trade is opened by selling Coffee and by buying Cotton at the time t_0 and when the cointegration error gets back to its mean at the time t_1, the positions are closed out while buying Coffee and selling Cotton.

Profit per trade before transaction costs

#: Quantity of Commodity,

Π: Price of Commodity

Profit Upper Bound=#Shares (Π Cotton t_1-ΠCotton t_0) +#Shares (Π Coffee t_0-ΠCoffee t_1)

Profit Lower Bound=#Shares (Π Cotton t_0-ΠCotton t_1) +#Shares (Π Coffee t_1-ΠCoffee t_0)

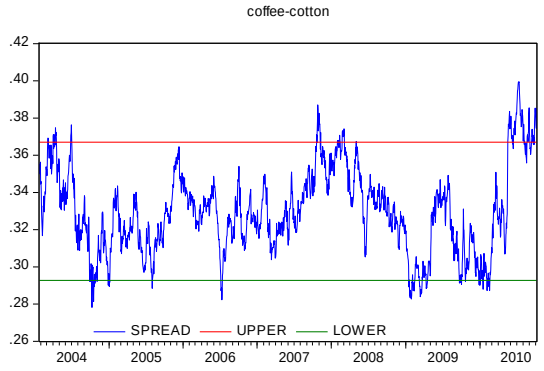
The figure 4 shows that during the formation period, pairs of residuals show sufficient levels of mean reversion so that the portfolio could be traded regularly enough to make a profit.

Long Cotton and Short Coffee: Log Coffee (-1) - 0.6666*Log Cotton (-1)-0.443 and

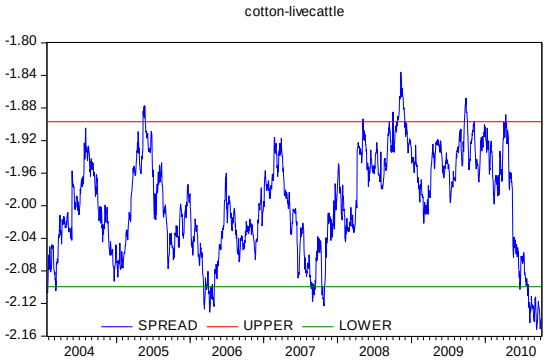
Long Cotton and Short Livecattle: Log Cotton (-1) -2.5023*Log Livecattle (-1) +0.003

Figure 4: Residual Series with Pre-Determined Upper and Lower Bound

a) Plot of C/TT Residual Series



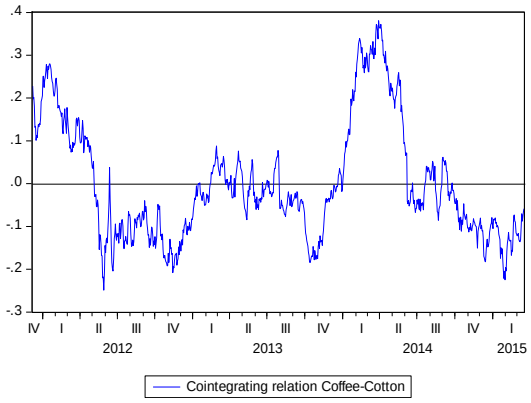
b) Plot of LE/TT Residual Series



During the formation period for coffee-cotton pair, 4 out of 5 trades are completed. While the average trade duration is 72.8 days, the total profit is $69,123. When the average return per trade is 6.14%, the average annualized return is 21.25%pa. For the pair of cotton-livecattle, 5 trades are completed. While the average trade duration is 106 days, the total profit is $633,655. When the average return per trade is 199.1%, the average annualized return per trade is 477.33%.

Figure 5: Cointegration Error for the Trading Period

a) Plot of C/TT Residual Series



b) Plot of LE/TT Residual Series

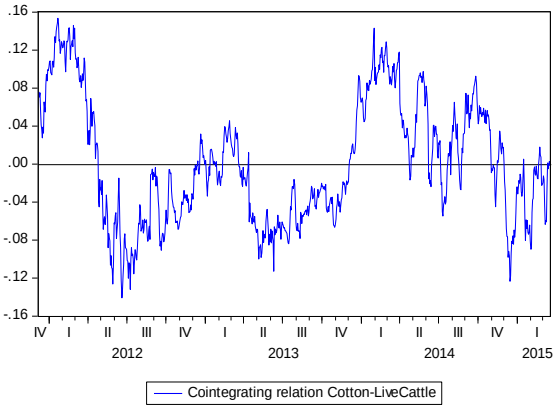
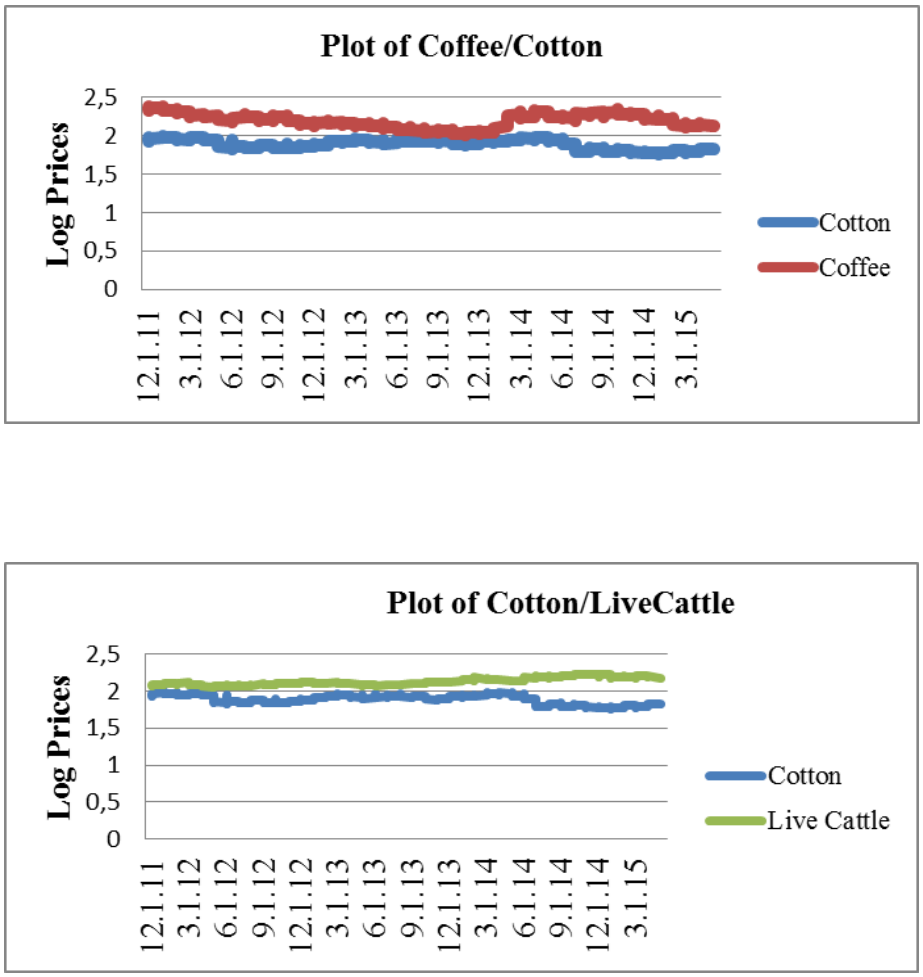


Figure 6: Log Prices for The Trading Period



The figure 5 shows the cointegration error for the trading period but it is assumed that the cointegration relationship in the formation period still continues to hold in trading period. The figure 6 presents the logarithmic prices of the 2 pairs. Since May 2011, almost all agricultural commodity prices have been in a long-term crash due to an increasing supply, a competition and a reduced demand. During 2012 and 2013, coffee and cotton prices were declined dramatically. After the first quarter of 2014, nearly all commodity prices increased except cotton prices peaked in May 2014 but after that cotton prices suffered a rapid decline. Meanwhile live cattle futures prices have increased gradually. The upward trend started in 2009, with largest price increase occurring in 2014. The standard deviation of coffee/cotton pair is 0.098 and the mean of coffee/cotton is 0.492. During the trading period for the coffee/cotton pair, 2 trades are completed and the average trade duration is 159 days. Also, for the coffee/cotton pair, the total profit is $48,909, the average return per trade is 11%, and the average annualized is 17.4% pa. In the case of cotton/livecattle pair, the standard deviation is 0.2311 and the mean is -3.599. For cotton/livecattle, 3 trades are completed and the average trade duration is 142 days. The total profit is $372,343, the average return per trade is 202% and the average annualized return is 358.5% pa.

5. Conclusion

A Pairs trading strategy is widely popular in the finance world. In this paper, the concept of cointegration in pairs trading is applied to the agricultural future market. First unit root is tested and then Johansen test is applied to identify the cointegrated commodity pairs and to find the cointegration error. Only 7 out of 45 agricultural future market pairs conclude that they are cointegrated with the Johansen approach. As a result of the pair trading strategy, coffee-cotton and cotton-livecattle, two cointegrated pair of agricultural future contracts is obtained. Pairs trading strategy is applied to both the formation period and the trading period. Annualized profit for coffee-cotton and cotton-live cattle pairs; from formation period are 21.25% pa and 199.1% pa, from trading period are 17.4% pa and 358.5% pa, respectively. Tests of these periods show that the pairs trading strategy is outperformed. This study finds that pairs trading in commodity futures markets earn statistically a significant return.

This paper does not address the source of the profitability of pairs trading strategy from the characteristic of agricultural futures prices: extrinsic events such as climatic, political and governmental forces, strong mean reversion, high volatility, large price spikes and interest rates. The relationship between real interest rates and real commodity prices plays an important role in the prices of commodities. The result of easy monetary policy is associated with low real interest rates since 2008, which boosts the prices of agricultural commodities. The findings of this study reveal that the strategy of pairs trading is also outperformed during this period. Overall, the relative value arbitrage strategy relies on the trader's ability not only to identify to find but also to capture the divergence and mean-reversion movement. The strong mean reversion and the high volatility may cause high excess returns from the pairs trading strategy, especially in the pair of cotton-live cattle trades. In a stable economic and a financial environment, certain opportunities may be lost due to the low volatility in the relationship between the two related commodities to make a trade profitable.

In the future research, changing the length of formation/trading period, copula approach, Kalman filtering techniques, risk adjustment, and some trading rules would be useful for estimating profit patterns of the pairs trading strategy.

Table 1:Unit Root Test

	ADF	ADF (-1)	PP	PP(-1)
Soybean	*-1.8791	*-40.7345	*-1.9368	*-40.7219
	**-1.8803	**-40.7332	**-1.9389	**-40.7214
Corn	*-2.0573	*-40.7188	*-2.0530	*-40.7032
	**-2.05792	**-40.7274	**-2.0541	**-40.7120
Wheat	*-1.8925	*-42.9061	*-1.8466	*-42.9111
	**-1.8935	**-42.8990	**-1.8494	**-42.9031
Live Cattle	*-2.2553	*-16.6035	*-2.2666	*-42.4429
	**-2.2573	**-16.5798	**-2.2741	**-42.4303
Lean Hog	*-3.1620	*-40.4566	*-3.1447	*-40.4667
	**-3.1627	**-40.4548	**-3.1465	**-40.4660

Table 1. Continue

Rough Rice	*-1.8277 **-1.8286	*-38.1270 **-38.1337	*-2.1982 **-1.8330	*-38.3315 **-38.1218
Oats	*-2.3025 **-2.3032	*-38.3153 **-38.3253	*-2.2209 **-2.1988	*-38.5551 **-38.3417
Cocoa	*-2.0711 **-1.1041	*-28.6208 **-28.5957	*-2.2467 **-1.2316	*-42.0056 **-41.9792
Cotton	*-1.9730 **-1.9737	*-38.5660 **-38.5769	*-2.0215 **-2.0221	*-38.6303 **-38.6410
Coffee	*-2.3168 **-2.3176	*42.0085 **-42.0167	*-2.3258 **-2.3274	*-42.0114 **-42.0196

The critical t-statistic values for the ADF test are – 3.1281 at the 10% confidence level, - 3.4124 at the 5% confidence level and – 3.9633 at the 1%confidence level

*Trend + Intercept models applied

**Intercept no trend

Table 2:Cointegration Analysis

Period	**Time Span**	**Cointegrated Pairs**
1/12/2004-1/12/2011	1765 observations	TT-KT, ZC-ZO, TT-LE, TT-HE, ZW-ZS, ZW-ZR, HE-LE
20/12/2005-1/12/2011	1500 observations	TT-KT, TT-LE, LE-HE, ZR-ZS, ZR-ZW, ZS-ZW
18/12/2006-1/12/2011	1250 observations	TT-KT, ZR-ZS, ZR-ZW, ZS-ZW
14/12/2007-1/12/2011	1000 observations	ZR-ZW, ZS-ZW
11/12/2008-1/12/2011	750 observations	TT-KT ,ZS-ZW

Table 3: Number of pairs co-integrated

	Soybean	Corn	Wheat	Live Cattle	Lean Hog	Rough Rice	Oats	Cocoa	Cotton	Coffee
Soybean		No	Yes	No	No	Yes	No	No	No	No
Corn	No		No	No	No	No	Yes	No	No	No
Wheat	Yes	No		No	No	Yes	No	No	No	No
Live Cattle	No	No	No		Yes	No	No	No	Yes	No
Lean Hog	No	No	No	Yes		No	No	No	No	Yes
Rough Rice	Yes	No	Yes	No	No		No	No	No	No
Oats	No	Yes	No	No	No	No		No	No	No
Cocoa	No	No	No	No	No	No	No		No	No
Cotton	No	No	No	Yes	Yes	No	No	No		Yes
Coffee	No	No	No	No	Yes	No	No	No	Yes	

References

Bianchi, J.R., Drew, E.M., Zhu, R. (2009), Pairs Trading Profits in Commodity Futures Markets, Unpublished Paper, Queensland University of Technology, Griffith Business School

Bogomolov, T. (2010), Pairs trading in the land down under. Finance and Corporate Governance Conference 2011 Paper. Bundoora, Australia.

Bogomolov, T. (2013), Pairs Trading Based on Statistical Variability of The Spread Process, Quantitative Finance, 13:9, 1411-1430

Bowen, D., Hutchinson, M.C., O' Sullivan, N. (2010), *High Frequency Equity Pairs Trading: Transaction Costs, Speed of Execution and Patterns in Returns.* The Journal of Trading, 5(3), 31-38.

Broussard, J.P., Vaihekoski, M. (2012), *Profitability of pairs trading strategy in an illiquid market with multiple share classes*.

Journal of International Financial Markets Institutions & Money, 22, 1188-1201.
Caldeira, F.J., Moura, V.G. (2012), Selection of a Portfolio of Pairs Based on Cointegration: The Brazilian Case, Federal University of Rio Grande do Sul, Federal University of Santa Catarina, Brazil
Chen, J.H., Chen, J.S., Li, F. (2012), Empirical Investigation of Equity Pairs Trading Strategy, http://ssrn.com/abstract=1361293
Chiu, C.M., Wong, Y.H. (2012), Dynamic Cointegrated Pairs Trading: Time-Consistent Mean-Variance Strategies
Do, B., Faff, R. (2010), *Does Simple Pairs Trading Still Work?* Financial Analyst Journal, 66(4), 83- 95.
Do, B., Faff, R. (2010), *Are Pairs Trading Profits Robust to Trading costs?* The Journal of Financial Research, 35(2), 261-287.
Do, B., Faff, R., Hamza, K., (2006), A New Approach to Modeling and Estimation for Pairs Trading, Unpublished Paper, Monash University
Ehrman, S.D., (2006), The Handbook of Pairs Trading-Strategies Using Equities, Options & Futures, John Wiley & Sons, Inc., New Jersey
Elliott, R.J., Van der Hoek, J., Malcolm, W.P. (2005), *Pairs Trading.* Quantitative Finance, 5(3), 271– 276.
Engelberg, J., Gao, P., Jagannathan, R., (2009), An anatomy of pairs trading: the role of idiosyncratic news, common information and liquidity. Unpublished working paper. University of North Carolina, University of Notre Dame, Northwestern University.
Frankel, A.J.(2014), Effects of Speculation and Interest Rates in a "Carry Trade" Model of Commodity Prices, Journal of International Money and Finance, 2014
Fung, D.A.(1999), A primer on hedge funds. Journal of Empirical Finance, 6(3): 309-331.
Galenko, A., Popova, E., Popova, I.(2007), Trading in The Presence of Cointegration
Gatev, E.G., Goetzmann, W.N., Rouwenhorst, K.G. (1999), *Pairs Trading: Performance of a Relative Value Arbitrage Rule.* NBER working paper, No. 7032.
Gatev, E., Goetzmann, W.N., Rouwenhorst, K.G. (2006), *Pairs Trading: Performance of a Relative-Value Arbitrage Rule.* The Review of Financial Studies, 19(3), 797-827.
Herlemont, D., (2004), Pairs Trading, Convergence Trading, Cointegration, Unpublished Paper,YATS Finance and Technologies
Heymans, A., (2008), Managing an Agricultural Commodities Portfolio in South Africa with Pairs Trading, PhD Thesis, The Centre for Business Mathematics and Informatics of The North-West University
Hillebrand, E., (2003), A mean-reversion theory of stock-market crashes. Working Paper. Center of Finance & Risk Management, Gutenberg University.
Huck, N. (2009), Pairs selection and outranking: an application to the S&P 100 index. European Journal of Operational Research 196, 2, 819-825.
Huck, N. (2010), *Pairs trading and outranking: The multi-step-ahead forecasting case.* European Journal of Operational Research, 207, 1702–1716.
Huck, N. (2013), The High Sensitivity of Pairs Trading Return, Applied Economic Letters, 20:14, 1301-1304.
Huck, N., Afawubo, K.(2015), Pairs Trading and Selection Methods: Is Cointegration Superior? Applied Economics, 47,6, 599-613
Jacobs, H., Weber, M. (2011), Losing sight of the trees for the forest? – Pairs trading and attention shifts. Unpublished working paper. University of Mannheim.
Jacobs, H., Weber, M., (2013), Losing Sight of The Trees for The Forest? – Attention Allocation and Anomaliesm
Kanamura, T., Rachev, S., Fabozzi, F. (2010), A profit model for spread trading with an application to energy futures. The Journal of Trading 5, 1, 48-62.
Lin, Y., McCrae, M., Gulati, C. (2006), Loss protection in pairs trading through minimum profit bounds: a cointegration approach. Journal of Applied Mathematics and Decision Sciences 2006, 4, 1-14.
Miao, J.G. (2014), High Frequency and Dynamic Pairs Trading Based on Statistical Arbitrage Using a Two-Stage Correlation and Cointegration Approach, International Journal of Economics and Finance, 6,3,Canadian Center of Science and Education
Mori, M., Ziobrowski, A.J. (2011), *Performance of Pairs Trading Strategy in the U.S. REIT Market.* Real Estate Economics, 39(3), 409–428.
Mudchanatongsuk, S., Primbs, A.J., Wong, W. (2008), Optimal Pairs Trading: A Stochastic Control Approach, 2008 American Control Conference, Washington

Muslumov, A.A.Y. (2009), The profitability of pairs trading in an emerging market setting: Evidence from Istanbul stock exchange. The Empirical Economics Letters, 8(5): 495-500.
Nath, P. (2003), High frequency pairs trading with U.S. treasury securities: Risks and rewards for hedge funds. Unpublished Working Paper, London Business School.
Nicholas, J.G. (2000), Market neutral investing. Long/short hedge fund strategies. Bloomberg Professional Library: Bloomberg Press.
Papadakis, G., Wysocki, P. (2008), Pairs trading and accounting information. Unpublished working paper. Boston University School of Management, MIT Sloan School of Management.
Perlin, M., S. (2009), *Evaluation of pairs-trading strategy at the Brazilian financial market.* Journal of Derivatives & Hedge Funds, 15(2), 122-136.
Pizzutilo, F. (2013), A Note on The Effectiveness of Pairs Trading for Individual Investors, International Journal of Economics and Financial Issues, 3,3, 763-771
Puspaningrum, Lin, Y.X., Gulati, C. (2009), Finding the optimal pre-set boundaries for pairs trading strategy based on cointegration technique. Working Paper No. 2109. Centre for Statistical and Survey Methodology, University of Wollongong.
Puspaningrum, H. (2012), Pairs Trading Using Cointegration Approach, PhD Thesis University of Wollongong School of Mathematics and Applied Statistic
Schmidt, D.A. (2008), Pairs trading: A co-integrating approach. Finance Honours Thesis, University of Sydney. Retrieved July 2013, from University of Sydney. Available from: http://ses.library.usyd.edu.au/bitstream/2123/4072/1/Thesis_Schmidt.pdf.
Xie, W., Wu, Y. (2013), *Copula-Based Pairs Trading Strategy. W*orking paper, available at SSRN: http://ssrn.com/abstract=2209209.
Vidyamurthy, G. (2004), Pairs trading: Quantitative methods and analysis. John Wiley & Sons.
Yu, S. (2011), Pairs - Trading on divergent analyst recommendations. Journal of Investment Management 9, 4, 75-95.

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IRRATIONAL HUMAN BEHAVIORS

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Abstract:

Neo Classical economists used to posit that, since consumers are rational, they make decisions to maximize their pleasure (utility). Opposing to Neo Classical understanding, Behavioral Economists argue that, consumers are infect not rational, but prone to all sort of biases and habits that pull them being rational. For instance, there are too many irrational choices made by the Turkish consumers like; expensive wedding parties given by low income families; although riding bicycle is healthy and cheap, but people buy expensive cars; it is cheaper staying at a hotel or a timeshare, however people buy expensive summer houses, where they stayed only few weeks a year. These type of irrational behaviors adversely affect the decisions on savings, investments and economic growth. On the consumers irrationality, Tversky and Daniel Kahneman, winner of the 2002 Nobel Prize in Economics, wrote Prospect Theory. They developed a cognitive psychological model to explain divergences from neoclassical economics. They claimed that people take decisions under psychological, social, emotional and economic factors that affect market prices and resource allocation. In order to explain the irrational behaviors of Turkish consumers, I utilized some concepts such as conspicuous consumption (or keeping up with Johns), Veblen Effect, Bandwagon Effect, bounded rationality, 20 to 80 Law and ethical considerations developed by Behavioral Economists and Heterodox Economics. Thus, I came to conclusion that why the free market economic understanding fails in Turkey by giving some examples and economic reasons stated in the last section of this paper.

Keywords: *Behavioral Economics; Heterodox Economics; Conspicuous Consumption; Veblen Effect; Bandwagon Effect*

1. Introduction:

Adam Smith's Unseen Hand Doctrine dominates the Classical Economics Thoughts, as being the foundation of the capitalism. Perfect Market Mechanism of the capitalist system depends on the rational behaviors of the people. In real life, this understanding doesn't hold true as claimed by the behavioral economists and heterodox economics thought. Although, free market economic understanding failed during the Great Depression and in later economic crisis, however it is being supported by monetary economists, big business and financial capital. Deregulation of public services, privatization of state economic enterprises and financial liberalization policies resulted in worldwide economic and debt crisis. For this reason, the aim of this paper is to explain why the free market understanding based on rational human behavior can not be justified. In order to support my view, I summarize the basic views of behavioral economics and heterodox economics popular after 1970's. Based on irrational human behaviors, I also employed principles of public economy in defending my thesis on why free market understanding can not solve economic problems in the conclusion section.

In the first section, irrational behaviors of the consumer as explained by Kahneman, Tversky, Veblen, Akerlof, Pareto and Minsky are summarized (Şener 2015). All these economists claim that consumers are not rational as Adam Smith formulated. They argue that, consumer behaviors are determined by social value judgments, social values, habits, and non economic factors. These behaviors take the different forms of showing offs such as conspicuous consumption motivations, Veblen, Bandwagon, and Snob Effects. The second section includes some concepts, against rational human behavior understanding, developed by heterodox economist such as Lorenz and Minsky. These concepts are : Bounded Rationality, The Market for Lemons, 20 to 80 Law (Power Law), Happiness, Crash-Prone, and some ethical considerations, leading to inefficiencies that the market mechanism is potentially generating.

In the conclusion section of this paper, I support the above mentioned economists by giving some examples related to market imperfections, and irrational behaviors of Turkish consumers.

2. Behavioral Economics

Contrary to Adam Smith's Invisible (unseen) Hand Theory, behavioral economists argue that people are not taking rational actions. These economists claim that, people take decisions based on social values, habits and noneconomic psychological factors. For this reasons, they argue that as proclaimed by Adam Smith; "people behave along with their self-interest, selfishness and rational motivations" doesn't hold true in real life. There are many examples of irrational human behaviors, that don't fit this theory as follows.

• Although cigarette smoking is harmful, but many people are obese smokers.

• Trap prices like 99.90 Liras attracts people, especially those thinking of it is less than 100 Liras.

• Much type of competitions in business don't rest on economic grounds, but they are related to some

psychological and social factors.

• Especially in developing countries people are likely to behave in line with the conspicuous consumption or 'keeping up with Jones' motivations.

Behavioral economics examines the irrational economic activities of people as shown by these examples. This new economic theory is based on both economics and psychological factors, rather than traditional and mainstream economics principles. In fact, these new approaches highly affect the theories on savings and economic policies both in market and public economies. It also provides insights into the explaining very complex economic behaviors of human beings. Tversky and Kahneman were the pioneers in establishing the basis principles of this new branch of economics in 1970s. They successfully developed and adopted theories based on brain process information. According to them, when the people face uncertainty, they tend to behave randomly related to their mental shortcuts based on experience. They state that, people are strongly influenced by a certain proposition called 'framing', while taking decisions (Kahneman and Tversky 2003).

Another branch of behavioral economics known as 'neuroeconomics' becoming popular in explaining human economic motivations. Accordingly, the brain reacts to high price offers, as it reacts to abhorrent or disgusting smell.

The other branch of behavioral economics is called 'nudge economics' that explains the decisions based on their self interest or of their own preferences are closely related to their experiences and environmental preconditions. This means that, the assumptions explaining the human behavior rationality doesn't rest on self-interested motivation as formulated by Adam Smıth, because people are very complex.

3. Approaches against Rationality

Although, production was the concern of classical economist, early neoclassical economists analyzed the consumer preferences based on their behaviors. Especially, institutional economists studied the subject matter and its relevance to physiology and sociology. Although, mainstream economists assume that human being are rationale in making decisions; however they are not in their real life. The reason is, a rational human being logically reasons or employs the principles of reasoning consciously based on their daily life. The following cases such as conspicuous consumption motivation and Veblen's Effects are the examples of irrational behaviors of consumers.

4. Conspicuous Consumption

If you buy goods that fit your true preferences, as economists assumed, your behavior is rational. However, there are

many types of consumer behaviors that can't be accepted as rational. For instance, if you by a Mercedes car because your neighbor has one, but your purchasing power is not high enough to support. Then, your welfare will decrease since you are paying interest to banks, and maintenance costs such as insurance, depreciation, gas etc. On the other hand, your conspicuous consumption behavior not only reduces your welfare but it also wastes the limited sources of the society. Veblen used this term to explain the behavior of the wealthy people. He argued that, rich people are likely to display their economic and social power by buying very expensive consumption goods called statue goods. Some people buy goods to show off that they are "the part of the society" termed by bandwagon effect. There are also some people, exhibiting their consumption behavior to distinguish themselves from the society known as snob effect (Bagwell and Bernheim 2003). Women enforce their husbands to buy luxury car or villa as their neighbor has, called keeping up with Johns effect as in the case of USA and Turkey. Sometimes a consumer's demand for a good is connected to other people's perception. This happen to be when a consumer wants to show off his high status. Thus, a status good can only be owned by him, but the others can't. Suppose that, somebody else buys this good, he should buy another good that no one could own it. For instance, some rich people urge the restaurant owners, to increase the prices as much as possible, so that nobody could access to the service easily. All these types of consumer behaviors violates traditional price setting theory based on supply and demand laws. Above cases show that, demand curve becomes upward sloping, rather than downward sloping as economic theory assumed. The upward sloping demand curve displaces Veblen Effect. According to this effect, higher prices means better quality and thus higher demand for goods and services opposing to the demand law. This is why the expensive goods like mobile phones are even demanded by low-income families. Some economists opposed to principle of utility maximization based on the rational behavior of consumers. They prefer to use satisfying characteristics of a good rather than their marginal utility. This means that, a satisfying quantity is a good criterion to be used instead of utility maximization.

Another group of economists argue that, consumer behavior is shaped by social forms, value judgments and advises of some friends etc. For instance, during the fasting month demand for the food increases in Muslim countries. On the other hand some economists prefer to use the term of bounded rationality instead of rational consumer assumption. Keynes also used this notion of propensity to consume not in the sense of rational consumer behavior, but in psychological mean.

5. Heterodox Economics

History of economics has been dominated by orthodox economists who supported neoclassical economic theory. However, in 1970s economics thoughts was divided into two branches; orthodox and heterodox economics. Heterodox economists strongly opposed to the mainstream economists, who assumed that market mechanism is the best way to optimize consumer utility and profit maximization goal of the firms. Mainstream neoclassical economics thoughts are based on the following assumptions, which are rejected by the
heterodox economists.

- Markets are perfectly competitive,
- Supply and demand drives the prices to equilibrium,
- People behave rationally,
- Free markets optimize utility and profit maximization

Although, Orthodox economists became very influential at the universities and financial institutions, but they neglected socio economics and social justice issues. Thus, starting in 1970s, a number of heterodox branch of economics thoughts have been developed outside the mainstream economics. They developed many branches of heterodox issues such as, behavioral economics, asymmetric information, Power Law, happy economics, financial instability and complex systems of uncertainties.

6. Bounded Rationality

Using psychological principles raised by Daniel Kahneman and Amos Tversky tested the rational behavior assumption, assumed by neoclassical economists. They found that, people don't behave rationally and they referred

to this attitude known as "bounded rationality". They stated that, consumers have asymmetric attitude towards loss and gain. So, they often miss out on good opportunities. And, Tversky says that, we also dislike change, which explains why investors often find it hard to let go of under performing shares (Kahneman and Tversky 2003). Thus, people just couldn't let go of the rationality.

7. The Markets for Lemon

Neoclassical economists assumed that, perfect competition conditions exist in markets. They argued that large number of firms compete to sell the identical products. However, George Akerlof argued that, many people may not access to the same information about the markets. He investigated what happens when the people are unable to reach the same information. Based on his studies he developed a theory known as the "Markets for the Lemons". He considered a market where the good and bad used cars (or lemons) are sold. If the buyer has less information than the seller has, then the buyer would guess that car is of average quality. So, he is likely to pay the price of an average used car price. If the seller has good quality used car, he won't get high enough price, due to buyer's lack of information (Akerlof 1970). The result will be as Gresham stated for money: "The bads will drive out goods from the market".

8. 20 to 80 Law

Neoclassical economist didn't make necessary investigation on the income inequality, which leads growing disparities of wealth between rich and poor. The neoclassical economists rest on the Adam Smith's wealth distribution, while the heterodox economists argue that it does not hold true in industrial economies. Smith argued that an unseen (invisible) hand of the markets will divide the wealth between the rich and poor. Opposing to Smith's ideas about wealth distribution, Vilfredo Pareto formulated a law known as "20 to 80 Law" or Power Law. Accordingly, 20 per cent of the population holds 80 per cent of the total wealth. Although, Pareto stated this law in 19th century, however it holds true in the 21stcentury. For instance, after the 1970s too high salaries paid CEOs in rich countries. While the median salaries stagnated and people around the world struggled to feed. Amartya SEN believed that starvation is the characteristics of some people not having enough food to eat.

9. Happy Economics

After 1950s economists argued that there wouldn't be strong relations between happiness and GNP level. Thus, classical economists' interpretation of happiness related to material well being is criticized by heterodox economists (Luigino 2008). Studies on life satisfaction revealed that, Americans were much more happier during the 1950s and 1960s, even though GNP level was less than in later decades. Surveys show that, once society reaches a certain level of average income, say 15 000 to 25 000 dollars per year, then happiness increases. Economists argue that, based on decreasing utility of income, happiness decreases above this income level. Then, any further increase in income has no significant effect on happiness levels. Veblen argued that, use of advertisement and marketing techniques makes people unhappy by buying new products. Conspicuous consumption behavior of people also makes them unhappy, because they by goods that actually they don't need.

10. Feminist Economics

A politician Marilyn WARING argues in her book "Counting for Nothing" many services performed by women and housewives are not included in GNP, because they are not paid. Examples of these includes bearing children, looking after sick, aged and disabled family members etc. However, most of these services of women are paid or tax exempted in Scan and in some social democratic countries in Europe. Feminist economists highly criticized neoclassical economic theory because, it favors for rational economic man. Thus, they promote male values such as competitiveness and individualism. Contrary to neoclassical economists they argue that women's contribution to social capital needs to be taken into account.

11. Crash-Prone

In 1990s economists claimed that, economy is not fundamentally stable as assumed by neoclassical economists. Hyman MINSKY (1919-96) argued that the economy is prone crashes and bubbles. He stated that, "During to prosperous times, debt accumulates in the economy as success breeds increasing confidence as Keynes's "animal spirit". According to him this process, known as the Minsky Moment, continues until it finally reaches a crisis point. When the debts get called in and the economy crashes. Minsky's claim that the economy is crash-prone has been evidenced through many bubbles. Mortgage bubble in the USA, Dutch Tulip Mania in 17th Century and British South Sea bubble are the historical evidences that supporting the Minsky's claim (Minsky 1986). Efficient Market Hypothesis assumed by neo classical economists was strongly criticized by Benoit Mantelbrot. He argued that since 1960 economic data on price changes didn't follow the Bell Curve analysis as predicted by that hypothesis (Mantelbrot 1999). This means that, Efficient Market Hypothesis doesn't hold true the hypothesis has foreseen. He believed that, 20-80 Law distribution is a better tool to predict the crashes. He also argued that, although the price changes are small, if all prices of goods are considered, then income distribution will be adversely affected. Because, Power Law effect becomes very important in developing crashes.

12. Ethics

The neoclassical understanding of the economy as stable, rational and self-regulation turned out to be highly misleading. Some fund managers like Soros and Jean-Philipe Bouchaud believed that, neoclassical economics failed to predict what is going on in the markets. The big shock from the subprime crises proved that, it was resulted due to unreliable behaviors of the big traders. Some of the Wall Street traders like Goldman Sachs was accused of misleading the investors in financial markets. Traders and mortgage brokers pushed the investors to sign contracts, that the investors didn't understand, leading to asymmetric information problems, in 2010 subprime crises. Speculations and manipulations undertaken by traders in Turkish financial markets also resulted in collapsed in many years. Thus, some economists believe that, these problems are due to lacking of ethical behaviors, not considered during the formation of neoclassical theories. This is due to fact that, ethical considerations emphasized by Aristotle and Scholastics economics were removed by the neoclassical economists. For this reason, the invisible hand doctrine is not reliable and not satisfactory as far as ethical behaviors are concerned. Thus, a new kind of economics is being emerging nowadays. Because, rational man assumptions as believed by neoclassical economists is being replaced by behavior of real people motivations. Thus, instead of seeing the economy as competition between disconnected people, sustainability of resources and value judgments of people is becoming important.

13. Examples Of Irrational Behaviors

There are many examples of irrational behaviors of Turkish consumers that fit to above mentioned cases;

- Boys start to smoke, thinking of they are accepted as a grown up man by the society.
- Trap prices attract many consumer as in Western societies.
- According to a survey conducted in 2000s, Turkish consumers ranked number 1, all over the European countries in buying Nokia mobile phones.
- Number of the cars is the highest in Turkey as compared to European countries.
- Consumers buy houses with one extra room to be allocated to guests.
- Members of low income families buy very expensive mobile phones.
- Number of the summer houses owned by the middle class, in costal areas exceeds 2 millions, even though most of them are used only few weeks in a year.
- Number of the Mercedes cars in Turkey, exceeds the total number of the same brand cars in European countries.
- Rich families generally send their kids to universities abroad, without considering the quality of the education.
- Wives urge their husbands to buy luxury cars, villas, and yachts to keep up with their neighbors.

• Businessmen never report their counterparts who evade taxes and conducting unofficial and illegal economic activities.
• Framing and false advertisements changes the true preferences of consumers in buying goods that they actually need.
• Although Turkey is rich in grape product, however wine production is the least in EU.
• Many investors never deposit their savings at bank, but they prefer to receive profit shares from the İslamic banks, which is more or less equal to market interest rate.
• Workers, governmental employees, low income families support the right wing political parties. Whereas intellectuals support social democratic party.
• Turkish workers abroad support social democratic and left wing parties, whereas they support right wing political parties at home.
• Many people in Turkey buy medicine on the recommendation from the friends, neighbors or pharmacists.
• Some rich people urge luxury restaurants to charge highest prices, so that everyone wouldn't support to eat there.

14. Conclusion

During the Adam Smith time there were no monopolistic and oligopolistic market structure. For this reason, he didn't consider market imperfections. Natural monopolies such as state economic enterprises decreases the cost of production more than the market firms, due to economics of scale. On the other hand, social allocation can only be efficient under decreasing marginal cost production by the natural monopolies. Positive and negative externality generating economic activities can not be priced by the market mechanism. For instance, goods and services produced under zero marginal cost must be provided free of charge, opposing to the profit maximization motivation of market firms. Asymmetric information misleads the consumers, because seller know much about the characteristics of the goods, than the buyers. For instance, consumers are not likely to read the manuals of medicines, insurance policies and mobile phones etc. Waste and mismanagement in government and in market economy increase the cost of production, reducing the efficiency in public and private economies. Corruption tempts the bureaucrats to behave in line with the Veblen and Bandwagon Effects give rise to conspicuous consumption motivation to operate. Existence of unfair income distribution as formulated by 20 to 80 Law, result in low purchasing power in market economy leading to decrease in effective demand and inefficient market conditions. All these examples call for regulating some of consumer's irrational behaviors and governmental intervention in order to improve market conditions

References

Akerlof G. (1970), The Market for Lemons, Yale University Press
Bagwell L.S. and Bernheim D. (1996), "Veblen Effect Theory of Conspicuous Consumption", The American Economic Review, 86(3), pp 349-373
Friedman, M., (1962), Capitalism and Freedom, University of Chicago Press
Kahneman D. and Tversky A. (2003), Choices, Values and Frames, Cambridge University Press
Luigino, B., (2008), Handbook on the Economics of Happiness, Edward Elgar Publishing.
Libenstein H., (1950), "Bandwagon, Snob, and Veblen Effect in the Theory of Consumer's Demand", Quarterly Journal of Ecoonomics, Oxford University Press, 64(2), pp 183-207
Mantelbrot, B., (1999), "Multifractal Walk down Wall Street", Scientific American, 280(2), pp 70
Minsky, H., (1986), Stabilizing an Unstable Economy, Yale University Press, New Haven
Nash, J.F. (2002), "Ideal Money" Southern Economic Review, 69 (1), pp 4-11
Şener, O., (2015), Ünlü Ekonomistler Ansiklopedisi, Beta, İstanbul
Tversky A, and Kahneman D , "Rational Choice and Framing of Decisions", Oct 1986, p. 251
Wilkinson N., and Kleas M. (2012), An Introduction to Behavioral Economics, Palgrave Macmillan

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CONSUMER INSIGHT AS COMPETITIVE ADVANTAGE USING BIG DATA AND ANALYTICS

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Abstract:

Digital revolution serves as a competitive advantage to businesses that are able to analyze consumer behavior in order to gain insights for their strategic advantage. After the advent of Internet, the past two decades witnessed generation of vast amount of business data. The amount of data is so huge that traditional database management system approaches falls short of managing and analyzing this data. This paper explores the characteristics of this phenomenon called Big Data together with Analytics as a tool for marketers to gain insights about consumer behavior and hence provide competitive advantage to the businesses. It also discusses some best practices as case studies.

Keywords: *Big Data, Big Data Analytics, Consumer Insight, Social Media, Sentiment Analysis*

1. Introduction:

Data provide behavioral insights about consumers. In today's highly competitive environment, translating those insights into market advantage is a key differentiator as described by Fayyad et al. (1996). In recent years, businesses generate more data than they are able to use. Now, the marketers are not only capable of getting rich data on consumer behavior, they can also do this in real time. Formerly possible but not feasible idea of capturing and analyzing in depth data about individual customers now also became feasible. This is because the rapid developments in technology enabled widely available data, which is much cheaper to access and store as stated by McAfee et al (2012)

Analytics generally refers to the tools that help find hidden patterns in data. What is different today is the enormous volume, velocity, and variety of data available about individual consumers. This results in a Big Data revolution that has the potential to lead to entirely new ways of understanding consumer behavior and hence help formulate new marketing strategies. In this paper, Big Data analytics is defined as the extraction of hidden insight about consumer behavior from Big Data applying that insight in business decisions. Big Data is considered a new form of capital in today's marketplace as described by Mayer-Schönberger and Cukier (2013).

This paper first examines the Big Data and Big Data Analytics phenomenon as a strategic weapon for the marketer to gain insights on consumer behavior. Data, Big Data, and Big Data Analytics concepts are investigated first. Afterwards, some of the best practices of the field are discussed.

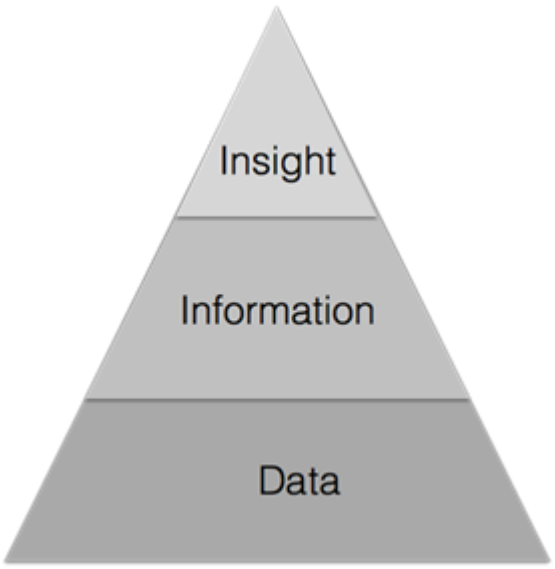
2. Literature Review

2.1. From Data to Insights

Data is fundamental to information and information is fundamental to insights. These concepts are sometimes mistaken with each other. The concepts are explained below.

- Data: Data can be defined as the raw numbers captured to measure something according to some agreed to standards. Having consistent standards is critical in this definition. It's also important to note that data is raw. It has no meaning on its own. It could be the IP address of a visitor, or for weather reports, temperature, air pressure, humidity etc.

Figure 1: From Data to Insights



Source: http://sageassessments.blogspot.com.tr/

- Information: Information refers to the sum of data points used to understand something about what's being measured. Collectively all data points give some very useful information. In the end, information is there to interpret the data and give it a meaning.

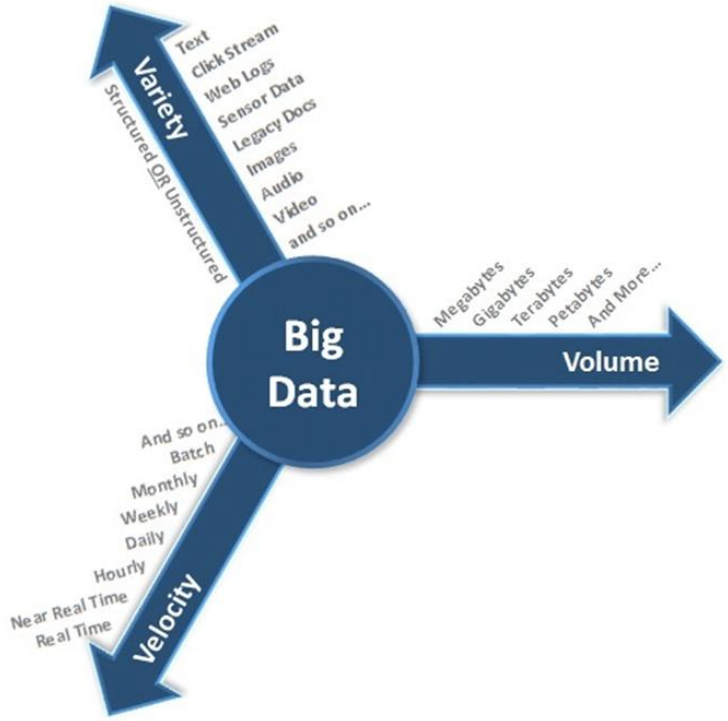
- Insight: Insight is gained by analyzing data and information to understand what is going on with the particular situation or phenomena. . Insight is acquired when conclusions are drawn from data and information. Insight building is the ultimate goal for data analysis and the world of big data. Insight serves as a means to make more informed and better business decisions.

As an illustration of the concept in weather situation, knowing the average temperature for your location might be helpful, but knowing that the average is steadily increasing over five years gives a better understanding and puts the information into context. And the context is relevant to the business problem at hand.

2.2 . Big Data

The estimate size of the digital universe in 2013 was 4.4 zettabytes according to Cisco (2014) (1 zettabyte is equivalent to 250 billion DVDs). By 2020, IDC group (2014) predicts that the digital universe is expected to reach 44 zettabytes. Big Data volume, in other words, the market for storing and analyzing Big Data is expected to double in size every two years. This data includes but is not limited to emails, audios, videos, images, logs, posts, search queries, health records, online transactions, social networking interactions, scientific data, sensor obtained data in smart devices and smartphone generated data, Eaton et all (2012). The massive growth of data made it impossible to manage it with conventional Database Management Systems (DBMSs). This leads to the definition Big Data. Gartner (2013) defines big data as high-volume, high-velocity and high-variety information assets that demand cost-effective, innovative forms of information processing that enable enhanced insight, decision-making, and process automation. Big data can be characterized with three distinct dimensions; high volume, high velocity and high variety.

Figure 2: Big Data Characteristics



Source: http://hadooptrainingsinhyderabad.blogspot.com.tr

- Volume: More than ninety percent of data created in history was created in the past two years. By 2020, the data generated is going to be 50 times more than the amount of data in 2011. With conventional methods, the creation of so much data used to cause serious problems. But now, with decreasing storage costs such big data this is no longer a problem to the marketer.
- Velocity: Data Velocity refers to the speed at which the data is created, stored and analyzed. In the past, big servers required substantial time to process data. In the big data concept, data is created almost in real-time. The new phenomenon, Internet of Things takes this one step further with machines sending their data at the moment of creation. Data is created at an enormous speed. As an example, as of year 2015, every minute, 100 hours of video is uploaded to YouTube, and 20 million photos are viewed.
- Variety: Many sources of Big Data provide a diverse richness that far surpasses traditional data from the past. A major difference between contemporary Big Data and traditional data, according to Integreon Insight (2012) is the shift from structured transactional data to unstructured behavioral data. Structured data like scanner or sensor data, records, files and databases have been collected by marketers for some time. Unstructured data include textual data like from blogs and text messages and non-textual data like from videos, images, and audio recordings. Much unstructured data are captured through social media, where individuals share personal and behavioral information with friends and family. Semi-structured data incorporate various types of software that can bring order to the unstructured data.

The ever-increasing amounts of Big Data lead to the question of value. The task is to eliminate unimportant and irrelevant data, so that the remaining data are useful. According to Lycett (2013), the remaining pertinent data also needs to be valuable for obtaining insight and domain-specific interpretation. The challenge, according to Oracle (2012) is to identify what is relevant and then rapidly extracts that data for timely analysis.

2.3. Big Data Analytics

Big data analytics is classified as descriptive, predictive and prescriptive analytics.

- Descriptive Analytics: Descriptive analytics aims at counting data and summarizing it with understandable reports. For example, with descriptive analytics, the impact of an advertising campaign can be analyzed. Additionally, the hidden patterns, trends in consumer behavior etc. can be spotted with descriptive analytics tools.

- Predictive Analytics: Predictive analytics uses historical data to detect recurring patterns and make trajectory about the future by making use of this historical data. Weather forecasts are a typical example to predictive analytics phenomenon. to infer data that we either can't collect, didn't collect or haven't collect yet.

- Prescriptive Analytics: Prescriptive analytics uses simulation modeling, optimization, what-if analysis, times series models and the like techniques to identify the best alternatives to minimize or maximize some objective. It's being used in many areas. For instance, it can be used by to determine the best pricing and advertising strategy for revenue maximization. The statistical methods for predictive analytics can be combined with optimization to make decisions assessing the uncertainty in the data.

3. Using Big Data and Analytics as a Competitive Advantage:

For centuries, the most common practice in business management used to be making strategic business decisions based on Highest Paid Person's Opinion (HiPPo) in the company as stated by McAfee and Brynjolfsson (2012). This intuition-based approach was not an option but a necessity due to the lack of an alternative.

In the last decade, thanks to the technical advances in consumer analytics and big data phenomenon, marketing has become much more measurable and technical than ever before. Marketers are now able to afford storing and analyzing vast amount of big data about their customers coming from a variety of sources to get 360-degree view of customer behavior. A lot of insight could now be obtained out of analyzing such big data. According to Athey (2013), there are now companies, which throw away the opinions of their senior executives and started to build genius teams of data scientists making sense of customer data. The valuable insights and conclusions these teams make give the direction as to where should the organization should be heading to.

Past research undertaken by Lavalle et al (2013) shows that many top performing organizations use analytics as a key differentiator The past research has also found that top-performing organizations made decisions based on this approach double the rate of lower-performing organizations. In another study by, McAfee and Brynjolfsson (2012), it's concluded that the more companies characterized themselves as data-driven, the better they performed on objective measures of financial and operational results top third of their industry in the use of data-driven decision making were on average, 5% more productive and 6% more profitable than their competitors.

3.1 New Channels, New Data, New Insights:

The social media revolution opens up brand new channels that enable more thorough view of consumer behavior analysis and insights. With foursquare-like services, marketers gain more understanding on consumer geospatial data whereas mere text messages, when aggregated, can give a tone of emotional reactions of consumers to a specific phenomenon.

A Hypothetical Scenario
The following scenario can explain, in a broader sense, the potential and capabilities of big data concept:
Imagine you are a blogger with thousands of followers. You decided to buy a new tablet from the online retailer, Amazon.com. When you unbundle the box and try to open your brand new tablet, you discover that it came broken.

As a result of this bad experience, you sat on your table and write a very negative blog revealing your experience. Imagine a call agent from amazon calling you to apologize and correct their mistakes by sending a brand new tablet to your address and saying: 'When we looked at your LinkedIn profile we saw that you changed your job recently, when we looked at your foursquare check-ins, it seems that you're on holiday. So, where do you want us to deliver your new tablet?'

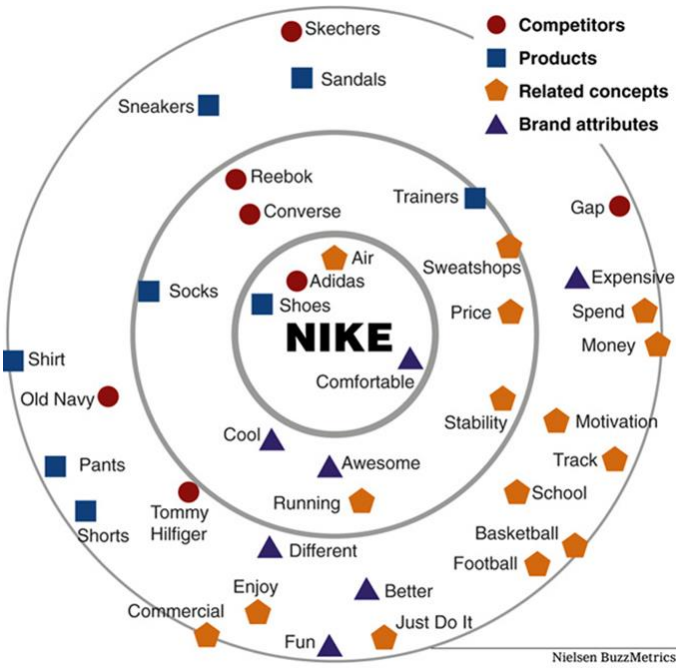
This interesting scenario illustrates the promise and potential of big data: it doesn't only imply the data the businesses own about their customers, but it also implies the data that's out on the internet about those customers. As data is available in more varieties, more valuable insights could be found.

4. Big Data Case Studies

4.1. Sentiment Analysis and Brand Associations – Nike Example

Sentiment analysis is an emerging domain regarding social media analytics according to Rajani (2009). It analyzes raw text data within user generated content to look at jargon, sentiment, orientation, polarity, label and the like and collapse the tone of the individual message down to 1 dimension, whether the message is positive or negative. By analyzing the degree of satisfaction of individual stakeholder, corrective action can be taken based on priorities, if necessary. A combination of keyword specific classification approaches as well as semantic classification approaches such as linguistic meaning may be used to achieve this goal. Such methods open up the possibility to address customer concerns in general. Taking this one step further, some advanced software packages even produces fairly rich brand association maps, as a result of analysis of all publicly available data accumulated since year 2007.
As an illustration, below is a Brand Associations map showing associations the public society attribute to Nike brand based on tens of thousands of tweets, public posts etc.

Figure 3: Nike Brand Associations Map



Source Nielsen, 2009

With the valuable insights brand associations map provide, the brand can;

- Understand, in order, how a category relates to a brand (i.e. for Nike, Shoes, Trainers, Socks, Shirts etc.)
- See how consumers see as the brands' closest competitor and other competitors with relative importance
- See related concepts and illuminate popular markets with great potential
- Identify early warning signs to potential threats and
- Recognize messaging attributes that can resonate to consumers in advertising efforts

4.2 Netflix

As an online streaming movie provider platform, with more than 60 million worldwide subscribers and more than 30 million daily movie plays, Netflix has got a very large data on consumer viewership habits. It doesn't only look at apparent rating data, but it looks more deeply on customer behavior data including; when consumers pause, rewind, or fast-forward, what day they watch content. The date they watch. What time they watch content. Where they watch (zip code). What device they use? When pause is pressed and content left and if they ever come back again., the ratings given, searches browsing behavior, and even data within movies by taking various screenshots to look at "in the moment" characteristics (Bulygo, 2013).

After analyzing this wealthy data, Netflix was pretty confident to say what content is ideal to hit the mainstream market and they went on to make a TV-series production from scratch. This production named House of Cards became a real success, bringing an estimate of 17 million new subscribers. Even in promoting the content to different audiences, Netflix prepared ten different versions of House of Cards trailer. For instance, the starring actor Kevin Spacey fans watched the trailer focusing on him whereas people who liked female oriented movies saw a different variation of the content. Netflix is also very successful with its recommendation engine. Based on its deep understanding of each and every customer, it's able to suggest the content that's most likely to interest the individual audience. Therefore, Netflix earns two thirds of its revenue attributing to recommendation engine Carr (2013)

4.3 Zest Finance

As a payday lender, Zest Finance is an Internet based financial company. Since the foundation in 2009, it received more than 100.000 loan applications. It makes heavy use of data to augment traditional underwriting. Using a regression model with thousands of variables and more than 10 models it tries to come up with insights on whom to depend more and whom to avoid as borrowers. By analyzing data, it found out that contrary to the normal way of filling the form where initials are in uppercase and other letters are in lowercase, those who do not plan to give back money fill in the initial application form all in capitals or all in lower case. After this finding, it began to discriminate and tend to reject those applications flagged as riskier. As a result of its data-driven innovative efforts, Zest Finance has achieved a %40 reduction in loan default rates and enjoyed a %25 increase in market share. Zest Finance also received interest of venture capitalists since 2011; it has attracted $62 million in venture financing, plus $50 million in debt financing as stated in BloombergBusiness (2014).

5. Conclusion

Marketers are increasingly using big data to gain invaluable insights about their customers. Big data has far reaching effects even for business management itself – businesses resort to big data to guide them as the wheat to do next in their strategic decisions, as opposed to relying on their CEO's opinion. This paper discussed big data and big data analytics concepts from the marketing and business management standpoint. Having examined the corresponding phenomenon, this paper examines the implications and potential of big data for the marketer. Finally, some of the industry best practices are discussed.

References

Ather, S., "How Big Data Changes Business Management", https://www.gsb.stanford.edu/insights/susan-athey-how-big-data-changes-business-management (accessed 21 November 2015)

BloombergBusiness(2014), "Lender Charging 390% Uses Data to Screen Out Deadbeats", http://www.bloomberg.com/news/articles/2014-10-01/lender-charging-390-uses-data-to-screen-out-deadbeats (accessed 20 November 2015)

Bulygo, Z.(2014), "How Netflix Uses Analytics To Select Movies, Create Content, and Make Multimillion Dollar Decisions", https://blog.kissmetrics.com/how-netflix-uses-analytics/ (accessed 20 November 2015)

Carr, D. (2013), "Giving Viewers What They Want", http://www.nytimes.com/2013/02/25/business/media/for-house-of-cards-using-big-data-to-guarantee-its-popularity.html (accessed 20 November 2015)

Cisco (2014). "Visual networking index IP traffic chart", http://www.cisco.com/cdc_content_elements/networking_solutions/service_provider/visual_networking_ip_traffic_chart.html (accessed November 18, 2015)

Eaton C., Deroos D., Deutsch T., Lapis G and P.C. Zikopoulos, (2012), "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", Mc Graw-Hill

Evans, James R., and Carl H. Lindner (2012), "Business analytics: the next frontier for decision sciences." Decision Line 43.2 4-6.

Fayyad, U., Piatetsky-Shapiro, G., & Smyth, P. (1996), "From data mining to knowledge discovery in databases", AI Magazine, 17(3), p.37–53.

Gartner (2013), "Gartner IT Glossary - Big Data", http://www.gartner.com/it-glossary/big-data (accessed 15 November 2015)

IDC (2014). "The digital universe of opportunities: Rich data & the increasing value of the internet of things" http://www.emc.com/collateral/analyst-reports/idc-digital-universe-2014.pdf (accessed 19 November 2015)

Integreon Insight (2012). "Big just got bigger. Grail Research", 1–17 http://www.integreon.com/pdf/Blog/Grail-Research-Big-Data-Just-Got-Bigger_ 232.pdf (accessed 20 November 2015)

LaValle, S., Lesser, E., Shockley, R., Hopkins, M. S., & Kruschwitz, N. (2013). "Big data, analytics and the path from insights to value", MIT sloan management review, 21.

Lycett, M. (2013). "'Datafication': Making sense of (big) data in a complex world", European Journal of Information Systems, 22(4), 381–386.

Mayer-Schönberger, V., & Cukier, K. (2013). "Big data: A revolution that will transform how we live, work, and think", New York: Houghton Mifflin Harcourt.

Nilesen Brand Association Map (2009), http://www.nielsen.com/content/dam/nielsen/en_us/documents/pdf/Fact%20Sheets/Nielsen%20Brand%20Association%20Map%20-%20US.pdf (accessed 18 November 2015)

Oracle (2012). "Big data for the enterprise" Oracle White Paper, 1–14 http://www.oracle.com/us/products/database/big-data-for- enterprise-519135.pdf (accessed 20 November 2015)

Rajani, N. F. (2011). "Social media analytics". Published thesis, Birla Institute of Technology and Science, Pilani (Rajasthan).

Scheer, L. K., & Stern, L. W. (1992). "The effect of influence type and performance outcomes on attitude toward the influencer", Journal of Marketing Research, 29(1), 128-142.